DOCUMENT RESUME

ED 124 395 SE 019 851

TITLE	Energy Facts II; Committee on Science and Technology, House of Representatives, Ninety-Fourth Congress, First Session. [Committee Print].
INSTITUTION	Library of Congress, Washington, D.C. Congressional Research Service.
PUB DATE	Aug 75
NOTE	473p.; Not available in hard copy due to marginal legibility of original document
AVAILABLE FROM	Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 ($4.55)
EDRS PRICE	MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Comparative Statistics; *Economic Research; *Energy; *Fuels; *Graphs; Natural Resources; Statistical Data; *Tables (Data)

ABSTRACT

This handbook contains a comprehensive selection of energy statistics. The first section contains information on United States and foreign energy including resources, production, consumption and demand, energy and gross national product, energy research and development, and miscellaneous data. The remaining sections contain data on energy sources such as coal, gas, nuclear power, oil, uranium, and solar energy. Energy source data cover domestic reserves, production and demand, prices, drilling and refining, storage and transmission, and shipping. All sources of the tables and graphs are listed and referenced. The appendices include a glossary of energy related terms, a definition of energy units, a list of abbreviations, and a table of conversion factors. (MR)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

SE

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED124395

[COMMITTEE PRINT]

ENERGY FACTS II

PREPARED FOR THE

SUBCOMMITTEE ON ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
NINETY-FOURTH CONGRESS
FIRST SESSION

BY THE

SCIENCE POLICY RESEARCH DIVISION
CONGRESSIONAL RESEARCH SERVICE
LIBRARY OF CONGRESS

Serial H

AUGUST 1975

Printed for the use of the Committee on Science and Technology

SE 019 851

[COMMITTEE PRINT]

ENERGY FACTS II

PREPARED FOR THE

SUBCOMMITTEE ON ENERGY RESEARCH,
DEVELOPMENT, AND DEMONSTRATION

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
NINETY-FOURTH CONGRESS
FIRST SESSION

BY THE

SCIENCE POLICY RESEARCH DIVISION
CONGRESSIONAL RESEARCH SERVICE
LIBRARY OF CONGRESS

Serial H

AUGUST 1975

Printed for the use of the Committee on Science and Technology

U.S. GOVERNMENT PRINTING OFFICE
53-136 O WASHINGTON : 1975

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $4.55

COMMITTEE ON SCIENCE AND TECHNOLOGY

OLIN E. TEAGUE, Texas, *Chairman*

KEN HECHLER, West Virginia
THOMAS N. DOWNING, Virginia
DON FUQUA, Florida
JAMES W. SYMINGTON, Missouri
WALTER FLOWERS, Alabama
ROBERT A. ROE, New Jersey
MIKE McCORMACK, Washington
GEORGE E. BROWN, JR., California
DALE MILFORD, Texas
RAY THORNTON, Arkansas
JAMES H. SCHEUER, New York
RICHARD L. OTTINGER, New York
HENRY A. WAXMAN, California
PHILIP H. HAYES, Indiana
TOM HARKIN, Iowa
JIM LLOYD, California
JEROME A. AMBRO, New York
CHRISTOPHER J. DODD, Connecticut
MICHAEL T. BLOUIN, Iowa
TIM L. HALL, Illinois
ROBERT (BOB) KRUEGER, Texas
MARILYN LLOYD, Tennessee
JAMES J. BLANCHARD, Michigan
TIMOTHY E. WIRTH, Colorado

CHARLES A. MOSHER, Ohio
ALPHONZO BELL, California
JOHN JARMAN, Oklahoma
JOHN W. WYDLER, New York
LARRY WINN, JR., Kansas
LOUIS FREY, JR., Florida
BARRY M. GOLDWATER, JR., California
MARVIN L. ESCH, Michigan
JOHN B. CONLAN, Arizona
GARY A. MYERS, Pennsylvania
DAVID F. EMERY, Maine
LARRY PRESSLER, South Dakota

JOHN L. SWIGERT, Jr., *Executive Director*
HAROLD A. GOULD, *Deputy Director*
PHILIP B. YEAGER, *Counsel*
FRANK R. HAMMILL, Jr., *Counsel*
JAMES E. WILSON, *Technical Consultant*
J. THOMAS RATCHFORD, *Science Consultant*
JOHN D. HOLMFELD, *Science Consultant*
RALPH N. READ, *Technical Consultant*
ROBERT C. KETCHAM, *Technical Consultant*
REGINA A. DAVIS, *Clerk*
CARL SWARTZ, *Minority Staff*

SUBCOMMITTEE ON ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION

MIKE McCORMACK, Washington, *Chairman*

KEN HECHLER, West Virginia
DON FUQUA, Florida
JAMES W. SYMINGTON, Missouri
GEORGE E. BROWN, JR., California
RAY THORNTON, Arkansas
RICHARD L. OTTINGER, New York
HENRY A. WAXMAN, California
PHILIP H. HAYES, Indiana
TOM HARKIN, Iowa
JEROME A. AMBRO, New York
CHRISTOPHER J. DODD, Connecticut
ROBERT (BOB) KRUEGER, Texas
MARILYN LLOYD, Tennessee
JAMES J. BLANCHARD, Michigan
TIMOTHY E. WIRTH, Colorado

BARRY M. GOLDWATER, JR., California
ALPHONZO BELL, California
JOHN W. WYDLER, New York
LARRY WINN, JR., Kansas
LOUIS FREY, JR., Florida
MARVIN L. ESCH, Michigan
JOHN B. CONLAN, Arizona

LETTER OF TRANSMITTAL

House of Representatives,
Committee on Space and Technology
Washington, D.C., June 1975.

Hon. Olin E. Teague,
Chairman, Committee on Science and Technology, House of Representatives, Washington, D.C.

Dear Mr. Chairman: As Congress deals with energy matters, it is important to evaluate many alternative policy options. Factual data, quickly available to answer questions facing lawmakers, is an important adjunct to this process.

In November of 1973, this Committee published a volume entitled *Energy Facts.* It described the history and status of world energy production, consumption, and supply, and its concise factual data made a valuable contribution to the deliberations of this Committee and the Congress.

Energy Facts remains so popular and continues to meet with such overwhelming demand that the publication was placed on sale by the Superintendent of Documents. But since much of the base energy data has changed over the past year, we saw great need to undertake a revision and update of the handbook, which is now entitled *Energy Facts II*. It will, I am confident, be of even greater assistance to every member of the Committee on Science and Technology, as well as other Members of Congress who have a deep interest in the energy problem.

Sincerely yours,

Mike McCormack,
Chairman, Subcommittee on Energy Research, Development, and Demonstration.

LETTER OF SUBMITTAL

THE LIBRARY OF CONGRESS,
CONGRESSIONAL RESEARCH SERVICE,
Washington, D.C., June 12, 1975.

Hon. MIKE MCCORMACK,
Chairman, Subcommittee on Energy Research, Development, and Demonstration, Committee on Science and Technology, U.S. House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I am submitting the handbook on energy, which was prepared at your request. It is an updated and revised version of the previous handbook entitled *Energy Facts*, prepared by the Congressional Research Service for use by the Subcommittee on Energy of the Committee on Science and Astronautics during the 93rd Congress.

Included in this revised handbook is a comprehensive selection of United States and foreign energy statistics. These are in a form of easy to read tables and graphs. The information here presented was obtained from primary sources and contains the most recent figures available to us at this date. All tables and graphs have been selected so that they may be used to provide answers to the most commonly asked energy related questions. A significant addition in this revised version of *Energy Facts* is a chapter on synthetic fuels, of major interest to the Congress. Of value, too, is the list of sources that offer good contact references for material beyond the scope and limitations of this report. The appendix includes an index for easy alphabetical reference to all tables and graphs. Also included is a glossary of the most frequently used energy related terms, a list of abbreviations, and appropriate conversion factors.

The handbook was compiled by Winifred Griffin Smith of our CRS staff. We hope that this updated compilation will serve your committee's needs as well as those of other committees and Members of Congress working in the energy field.

Sincerely,

LESTER S. JAYSON,
Director, Congressional Research Service.

INTRODUCTION

SCOPE AND LIMITATIONS

Energy Facts II contains a comprehensive selection of United States and foreign energy statistics. It also includes statistical tables on most common and some unconventional energy sources. Care has been taken to select tables that contain the most recent and best organized information available from primary sources.

The statistical tables and graphs are grouped by resources, production, consumption and demand, energy and gross national product, research and development, and other categories. The tables are intended to provide answers to the most commonly asked energy related questions. To limit this handbook to a size where it is useful, tables of greater detail and complexity were omitted. It is possible, however, to use data from a combination of tables to derive whatever is not contained within one table or graph.

All sources are indicated in section XIX of the report and referenced on each table and graph. The table of contents lists all tables and graphs which are grouped under general headings. The appendix has a comprehensive glossary of energy related terms, a definition of energy unit most commonly used in the United States, a list of abbreviations, and appropriate conversion factors. An alphabetical index allows easy access to all information contained within this handbook.

The preparation of this report was initiated by Congressman Mike McCormack, Chairman of the Subcommittee on Energy Research, Development, and Demonstration, Committee on Science and Technology, U.S. House of Representatives. It is a revised and improved version of a previous one issued at Mr. McCormack's direction during the 93d Congress, entitled *Energy Facts*. The handbook met with unprecedented legislative and executive agency as well as private sector demand and was placed on sale by the Superintendent of Documents. The overwhelming demand prompted the production of *Energy Facts II*, which should be of equal use to members of Congress working with energy matters and others with interest in energy.

WINIFRED GRIFFIN SMITH,
Analyst, Science and Technology,
Congressional Research Service,
U.S. Library of Congress.

CONTENTS

Page
Letter of transmittal (iii)
Letter of submittal (v)
Introduction (vii)
Sources (xix)
The President's energy program, 1975 State of the Union Message 1
The U.S. Energy Research and Development Administration and other organizations established by Public Law 93-438 13

United States and foreign energy statistics:

Resources:

World recoverable energy reserves 19
Estimated world supply function for commercial energy resources 20
Estimated world supply function for finite commercial energy resources 21
Measured world nonrenewable energy reserves 22
World hydroelectric power, developed and undeveloped, 1973 23
U.S. recoverable energy resources 24

Production:

World power data 27
    Ten countries with greatest installed capacity 27
    Electric power capacity 27
World energy inputs, electrical sector, 1960-90 28
U.S. energy supply, 1970-2000 29
U.S energy trade 30
Power supply regions as defined by the Federal Power Commission 31
Fossil fuel requirements for electric generation in physical units 32
Net generation by source, fuels, and hydropower—millions of kilowatt-hours 33-34
New capacity placed in commercial operation in the contiguous United States, 1963-73, and that on order and scheduled for service in the coming years as of October 1, 1974 35
Generation by fuel—total electric utility industry by States and kinds of fuel 36
Annual production of mineral energy resources and electricity from hydropower and nuclear power in the United States, 1960-73 (trillions of Btu) 37
Annual production of mineral energy resources and electricity from hydropower and nuclear power in the United States, 1960-73 (percentage) 37
Daily average U.S. domestic production of fossil fuels 38
Daily average U.S. domestic production of fossil fuels, in trillion Btu 39

Consumption and demand:

World energy consumption by region, 1960-90 43
World energy consumption by region, 1960-90 (quadrillion Btu) 44
World energy consumption by source, 1960-90 45
World energy consumption by source, 1960-90 (quadrillion Btu) 46
U.S. energy consumption 47
U.S. gross energy consumption, 1973-90 48
Cumulative U.S. gross energy consumption projections 49
Composition of U.S. energy use, 1970-2000 50-51
U.S. gross energy consumption patterns by source, 1960-74 52
U.S. gross energy end uses, 1973 53
U.S. energy consumption, 1970-2000 54
U.S. energy input, 1970-2000 55
Energy consumption per capita in the United States, 1950-1973 56

United States and foreign energy statistics—Continued

Consumption and demand—Continued

Page
- U.S. net energy consumption, by final consuming sector, 1960–73 57
- Annual consumption of energy resources by major sources in the United States, by consuming sectors, 1968–73 58
- U.S. net energy consumption, residential and commercial sectors, 1970 59
- U.S. net energy consumption, transportation sector, 1973 60
- Energy inputs into U.S. electricity generation, 1970–2000 61
- Annual consumption of mineral energy resources and electricity from hydropower and nuclear power in the United States, 1950–73 (trillions of Btu) 62
- Annual consumption of mineral energy resources and electricity from hydropower and nuclear power in the United States, 1950–73 (percentage) 62
- U.S. net electricity consumption by sector, 1973 and 1985 63
- Impact of Btu taxes on energy consumption and prices, 1980 64
- Alternative forecasts of U.S. electricity consumption 65
- Efficiency of energy utilization, 1960–85 ($11 oil) 66
- Efficiency of energy utilization, 1960–85 ($7 oil) 67

Energy and gross national product:

- Energy consumption growth relative to GNP growth, selected countries, 1960–71 71
- Energy consumption, gross national product and population relationships, actual years 1947–73, alternative projections to 1980, 1990 72
- Projected values of energy consumption per unit of GNP 73
- Trend of annual energy consumption with projections, and trend of unemployment with projections 74
- Relationship between GNP and natural gas consumption 75

Energy research and development:

- Direct energy R. & D. obligations and outlays fiscal year 1976 79
- Federal funding, nuclear and renewable energy R. & D., 1973 80
- U.S. energy R. & D. expenditures, Federal and private sectors, 1973 81

Miscellaneous data:

- U.S. energy prices, 1970–2000 85
- Energy facility cumulative capital requirements, 1975–85 86
- U.S. energy facility production lead times 87
- Projected U.S. pollution control expenditures, 1973–82 88
- National air quality standards for sulfur oxide, articulates and nitrogen oxides 89
- Heat rates and power generation costs for processes using coal fuel 90
- U.S. geothermal resources, areas of promise 91

Coal:

United States and foreign statistics:

- Estimated world supply function for coal 95
- Estimated world supply function for coal (including bituminous, subbituminous, lignite, anthracite) 96
- World recoverable coal reserves, 1973 97
- Bituminous coal and lignite: World production by country 98
- U.S. exports of bituminous coal, by continental groups and countries of destination, 1965–74 99
- U.S. exports of anthracite, by continental groups and countries of destination, 1965–74 100
- U.S. bituminous coal exports, in short tons and value, 1970–74 101
- U.S. anthracite exports, in short tons and value, 1970–74 102
- Bituminous coal imported for consumption in the United States, by country and customs district 103
- Exports of bituminous coal, by country group 104
- U.S. coal production and exports, 1960–74 105

U.S. reserves:

- U.S. demonstrated coal reserve base, January 1974 109
- Estimated U.S. supply function for coal 110
- Demonstrated reserve base of coals in the United States on January 1, 1974, potentially minable by underground methods 111

Coal—Continued

U.S. reserves—Continued

Page
Demonstrated reserve base of coals in the United States on January 1, 1974, potentially minable by surface methods ---- 112
Demonstrated coal reserve base of the United States on January 1, 1974, by method of mining ---- 113
U.S. low-sulfur coal reserves, production, distribution, 1973 ---- 114

U.S. production:

Production of bituminous coal and lignite in the United States, with estimates by weeks ---- 117
Production of bituminous coal and lignite, by State, with estimates by months ---- 118
Production of bituminous coal and lignite in the United States, by State and underground, strip, and auger mining ---- 119
Production of bituminous coal and lignite in the United States, by districts, and by underground, strip, and auger mining ---- 120
U.S. coal production, Federal and Indian lands, 1960–74 ---- 121
U.S. potential production of coal on Federal leases, 1973–90 ---- 122
Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, in 1973, by State ---- 123
Number of mines, men working daily, days active, and output per man per day at bituminous coal and lignite mines in the United States, in 1973, by State ---- 124
Production at underground bituminous coal mines, by State and method of loading ---- 125
U.S. coal trends, 1965–73 ---- 126

U.S. consumption:

U.S. coal consumption, by sector, 1973 and 1985 ---- 129
Consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States ---- 130

Shipping:

Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, in 1973, as reported by mine operators ---- 133–134
Bituminous coal and lignite shipped by unit train in the United States ---- 135
Distribution of bituminous coal and lignite, 1973, by method of movement and consumer use ---- 136
Total bituminous coal and lignite shipments and percent of grand total shipments, by geographic division and state of destination ---- 137
Shipments of bituminous coal and lignite by average sulfur content by consumer use in 1973 ---- 138
U.S. coal transportation costs, by mode ---- 139

Synthetic fuels:

Projected production of synthetic fuels from coal ---- 143
Costs of synthetic fuels from coal, 1973 ---- 144
Comparison of estimated Federal funding for selected coal research activities—fiscal years 1970–74 and fiscal years 1975–79 ---- 145
Summary of advanced fluidized bed processes ---- 146
MHD conversion process ---- 147
Summary of advanced MHD projects ---- 148
Summary of advanced liquid conversion processes ---- 149
Summary of low-Btu processes ---- 150
Low-Btu gas for electric power generation ---- 151
Summary of advanced high-Btu processes ---- 152
High-Btu gas ---- 153
Coal-oil-gas (COG) refining process ---- 154
Typical cost estimates and conversion efficiencies for producing synthetic fuels from coal ---- 155
Announced commercial and demonstration coal gasification plants (as of February 20, 1975) ---- 156
Estimated incremental cost of heating using gas and electricity from coal ---- 157
Comparison of investment and operating costs for liquid fuels from coal using consol synthetic fuel (CSF) and hydrocarbon research (HRI) processes ---- 158

Coal—Continued

Synthetic fuels—Continued

Page
Typical products, Sasol process 159
Process yield, Sasol process 159
Energy balance—coal to gasoline 160
Sulfur balance 160
Investment cost for coal-to-gasoline plant 161
Investment cost for coal-to-fuel oil plus naphtha plant 162
Energy balance coal to SNG 163
Sulfur balance 163
Investment cost for coal-to-SNG plant 164
Investment cost for coal-to-methanol plant using Koppers-Totzek gasification and ICI methanol processes 165
Estimated selling prices for environmentally acceptable synthetic fuels from coal 166
Water consumption in refining and conversion processes 167

Miscellaneous data:

Known Federal coal leasing areas for competitive bidding 171
Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, by States 172
Production and average value per ton, f.o.b. mines, of bituminous coal and lignite sold in open market and not sold in open market, by State 173
Cumulative land use, bituminous coal mining, 1930–71 174
Underground mine data for bituminous coal by State 175
Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment, by State 176
Fatal injuries, U.S. coal mining, 1935–73 177
Nonfatal injuries, U.S. coal mining, 1935–73 178

Annual average heat values:

Annual average unit heat of bituminous coal and lignite produced and consumed in the United States, 1955–73 181

Gas:

United States and foreign statistics:

Estimated world supply function for natural gas 185
Estimated world supply function for natural gas (excluding natural gas liquids) 186
World natural gas reserves, 1973 187
Summary of annual estimates of natural gas reserves in Canada, 1955–73 188
World natural gas production, 1973 189
Exports of natural gas from the United States, 1950–73 190
Imports of natural gas into the United States, 1950–73 190
U.S. natural gas supply, 1960–74 191

U.S. reserves:

Proved recoverable reserves and net production of natural gas 195
U.S. proved reserves of natural gas, as of December 31 196
Summary of annual estimates of natural gas reserves, 1950–73 197
Summary of annual estimates of natural gas liquids reserves, 1950–73 197
Estimated total proved reserves of natural gas in the United States 198
Alternative estimates of U.S. undiscovered natural gas resources 199
Net production and new additions to gas reserves 200

U.S. production:

U.S. wells producing gas at end of 1974 203
Estimated gross production of natural gas, by State, 1955–73 204
Estimated net production of natural gas, by State, 1955–73 205
Number of producing gas wells, by State, 1950–73 206
Number of producing natural gas wells on December 31, by States 207
Marketed production of natural gas and average wellhead price, 1950–73 208
Production and disposition of natural gas in the United States, 1950–73 208
Marketed production and interstate shipments of natural gas, 1973 209

Gas—Continued

U.S. demand:

Page

Industrial consumption of natural gas in the United States, by type of industry, 1950–73 213

Total liquefied petroleum gas sales in liquid form to ultimate consumer, by major use, 1950–72 214

U.S. natural gas consumption by sector, 1973 and 1985 215

Gas utility industry customers 216

Gas utility industry customers, by State, 1950–73 217

Gas utility industry customers, by State and class of service, averages for 1973 218

Gas consumed for electric generation, by State, 1950–73 219

Gas utility industry househeating customers 220

Gas utility industry househeating customers, by State, yearly averages for 1965, 1970, and 1972–73 221

Gas utility industry sales, by State and class of service, 1973 222

Transmission:

Gas utility industry miles of main 225

Gas utility industry miles of main, by State and by type of main, 1973 226

Storage:

Ultimate reservoir capacity of existing underground storage fields and number of pools 229

Inputs, outputs, and gas in underground storage, by State, 1973 230

Miscellaneous data:

Gas utility industry sales 233

Gas utility industry sales, by class of service, 1950–73 234

Average annual indexes of retail prices of specified fuels and electricity, 1950–73 and at quarterly intervals, 1973 234

Natural gas prices reported by major interstate pipeline companies 235–236

Gas utility industry, gas supply and disposition, 1950–73 237

Conversion table 238

Nuclear energy:

United States and foreign statistics:

Free world commercial nuclear power generation, 1974 241

Domestic forecast:

Nuclear power reactors in the United States 245

U.S. nuclear power station status 246

Nuclear powerplants in commercial operation: Capacity, generation, and capacity factor 247

Dates of expected commercial operation, nuclear powerplants with firm vendor commitments 248

Projected U.S. nuclear powerplant capacity, 1973–90 249

Nuclear plant licensing: Construction permit lead time 250

Nuclear powerplant lead time trends 251

U.S. central station nuclear power reactors 252

Nuclear powerplants fuel rod and assembly fabrication requirements and commitments 253

Reactor and fuel cycle parameters:

Nuclear fuel cycle 257

Nuclear fuel cycle, capital investment requirements 258

Power generation costs 259

Projected annual uranium returns vs. material reprocessed 260

Comparison of industry reprocessing vs. domestic uranium returns 260

Percent of feed requirements provided by domestic uranium returns 261

Industry processing plans 261

The light water reactor nuclear fuel cycle 262

Number of facilities in operation at each part of the nuclear fuel cycle, second, third, and fourth quarters of 1974 263

Annual domestic separative work requirements for new uranium enrichment plants February 1975 forecast, reference case 72 percent capacity factor 264

Fuel cycle interrelationships 265

Nuclear energy—Continued

Reactor and fuel cycle parameters—Continued

Page

Projected diffusion plant power levels and separative work available versus separative work required for the recommended GDP operating plan assuming supplying 364 GWE through fiscal year 1982 and 350 GWE thereafter 266

Summary of projected net separative work commitments 267

Typical pressurized light-water reactor 1,000 megawatt electric capacity 268

Summary of gas cooled reactor plant characteristics 269

U.S. demand:

Inventories of nuclear material 273

Miscellaneous data:

Frequency of fatalities due to man-caused events 277

Frequency of fatalities due to natural events 277

Frequency of property damages due to natural and man-caused events 278

Risk of fatality by various causes 278

Oil:

United States and foreign statistics:

Estimated world supply function for petroleum 281

Estimated world supply function for petroleum (including crude petroleum and natural gas liquids) 282

World crude oil reserves, by region, 1973 283

World crude oil production, by countries, 1974 and 1973 284

U.S. imports of crude oil by country of origin 285

Imports of crude petroleum into the United States by months, 1973 and 1972 286

U.S. exports of crude oil by country of destination 287

Exports of major refined products from the United States by country of destination 287

U.S. statistical summary for 1973 and 1974 and forecasts for 1975 288

How U.S. crude import sources are changing 289

1975 world drilling forecasts 290

1975 Canadian drilling forecast 291

World petroleum refining capacity, 1973 292

U.S. reserves:

Estimated reserves of crude oil in the United States 295

U.S. proved reserves of liquid hydrocarbons, as of December 31 296

Estimated proved recoverable reserves of liquid hydrocarbons in the United States, 1950–73 297

Changes in estimated proved recoverable reserves of crude oil, by State, during 1973 298

U.S. petroleum supply, 1960–74 299

U.S. production, consumption, and supply:

Production of crude petroleum (including lease condensate) in the United States, by PAD district and States: By month, 1973 and year, 1972 303

U.S. crude oil production and new oil well completions, by year 304

U.S. petroleum production, 1960–74 305

U.S. crude oil production, by States and districts 306

U.S. wells producing crude oil at end of 1974, by States 307

Supply, demand, and stocks of all oils by PAD districts 308

Total U.S. supply and demand—crude oil and lease condensate 309

Total U.S. supply and demand—all oils 309

Supply and demand for all oils in the United States in 1974 and a forecast for 1975 310

Projected U.S. crude oil production, 1985 311

U.S. petroleum consumption by product, 1960 and 1973 312

U.S. petroleum consumption, by sector, 1973 and 1985 313

Shipping:

Transportation of petroleum by pipeline in the United States: By month, 1973 and year, 1972 317

Interdistrict movements by tanker and barge of crude oil and petroleum products, by month, 1973 and year, 1972 318

Tanker and barge movements of crude oil and petroleum products from the gulf coast to the east coast, by region, by months, 1973 and year, 1972 319

Oil—Continued

Shipping—Continued

Page
Transportation of petroleum products by pipeline between PAD districts in the United States: By months, 1973 and year, 1972 320
Movements of petroleum products on the Ohio River and the Great Lakes from PAD District II to PAD District I: 1973 and 1972 321
Crude runs to stills and refinery receipts of crude oil by origin of the crude and method of transportation: Year 1973 322
Shipments of aviation fuels in 1973 and 1972 323

Refining:

Number and capacity of petroleum refineries in the United States and Puerto Rico, by Bureau of Mines Refining Districts, PAD Districts, and States: January 1, 1974 327
Petroleum administration for defense (PAD) districts 328
Bureau of Mines refining districts 328
Percent refinery yields of the major petroleum products from crude and unfinished oil reruns in the United States: By month, 1973 and year, 1972 329
Input and output at refineries in the United States, by districts: Year 1973 330
Summary of 1974 refinery capacity changes (operable refineries) 331
Refineries planned but not constructed due to opposition on environmental grounds 332
Fuels consumed for all purposes at refineries in the United States, by States: 1973 and 1972 333
Refinery production of residual and No. 4 fuel oil by sulfur content by PAD and refinery districts 1974 334

Oil stocks:

Stocks of crude petroleum in the United States by State of origin and month: 1973 337
Stocks of crude petroleum in the United States by location and month: 1973 338
Stocks of crude petroleum in the United States by classification and location, and month, 1973 339
Stocks held by refining and pipeline companies: December 31, 1973 340
Stocks of residual and No. 4 fuel oil held by refineries and bulk terminals by sulfur content by PAD and refinery districts: November 30, 1974 341

Sales, prices, and income:

Crude price changes in Mid-Continent, California, and west Texas, by years 345
Total sales of distillate-type fuel oils in the United States, by PAD district and State: 1973 and 1972 346
Sales of distillate-type heating oils in the United States, by PAD district and State: 1973 and 1972 347
Sales of residual-type heating oils in the United States, by PAD district and State: 1973 and 1972 348
Sales of all fuel oils (distillate-type and residual-type) for electric utility use, quantities burned in generating electricity, and inventories held by utility companies in the United States, by PAD district and State: 1973 349
Price indexes for items used for drilling and equipping wells 350
Cost index of oilfield tubular goods 351
Cost index for drilling contractor payments 351
Average number of U.S. drilling rigs in operation, by States 352

Miscellaneous data on petroleum and petroleum products:

Imports of residual fuel oil by percent sulfur by country of origin: January–November 1974 355–356
How gasoline prices will be affected by President Ford's new energy program 357

Drilling statistics:

Index map and exploratory drilling in Mexico (1974) 361
Total U.S. drilling activity, 1974, by general class 362
1974 U.S. completed wells—majors versus independents 363

Petroleum administration for defense (PAD) districts—Continued
Drilling statistics—Continued

Page
U.S. exploratory drilling activity, 1974, by classes 364
U.S. wells drilled to 15,000 feet and deeper (by depth brackets) in 1974 365
U.S. wells drilled to 15,000 feet and deeper 1966–74 365
Forecast of new U.S. wells and footage to be drilled in 1975 366

Oil and gas:
U.S. reserves:

Estimated total proved reserves of natural gas liquids in the United States 369

Enhanced recovery:

Improving secondary and tertiary methods of petroleum recovery 373
Production stimulation by massive hydraulic fracturing 374
Chemical explosive fracturing 375

Prices:

Crude oil prices, natural gas prices, and the generation of investment capital under President Ford's new energy program 379

Drilling statistics:

Exploratory drilling in Canada, 1974, by classes and types of completion 383
Exploratory drilling in Mexico, 1974 384
Total gas and oil new well completions 385
Total wells drilled in the United States, 1974 386
Total exploratory wells drilled in the United States, 1974 388
Development wells drilled in the United States, 1974 389
New-field wildcat wells drilled in the United States, 1974 390
Forecast of new U.S. producing well completions in 1975 391
U.S. average drilling costs, by type of well 392
Number of wells, footage drilled, and cost of drilling and equipping wells and dry holes 392
Drilling operations and expenditures, by type of well, 1971–72 393
Offshore drilling operations and expenditures, by type of well, 1971–72 393

Shale oil:
U.S. reserves:

U.S. estimated supply function for shale oil 397
U.S. oil shale deposits, Green River formation 398

U.S. production:

U.S. shale oil production potential, 1980–90 401
Shale oil production lead times, concurrent activities schedule 402
Land impacts, shale oil production, 1980–90 403
Energy balance, oil shale to gasoline and distillate fuel 404
Investment cost for the production of 50,000 bbl/day of gasoline plus light distillate from 30 gal/ton Colorado oil shale 405

Solar energy:
Miscellaneous data:

Projected Federal solar energy implementation 409
Estimates of potential impacts of solar energy technologies 410
Summary of potential impacts of solar energy technologies 411
Summary schedule for solar heating and cooling program 412
Summary schedule for solar heating and cooling research and development 413
Primary agency management roles for solar heating and cooling 414
Number of annual housing starts and the equivalent annual fuel savings using solar energy 415
Number of annual commercial starts and the equivalent annual fuel savings using solar energy 416
Number of commercial retrofits and the equivalent annual fuel savings using solar energy 417

Uranium:
United States and foreign statistics:

Estimated world supply function for uranium 421
Estimated world supply function for uranium (U_3O_8, equivalent uranium oxide in the ground) 422
World uranium reserves—$15 per pound U_3O_8 423
World uranium resources, reasonably assured reserves 424
World uranium resources, estimated additional resources 425

Uranium—Continued

United States and foreign statistics—Continued

Page

Cumulative world uranium requirements, desirable levels of reserves and estimated additional resources 426

Annual non-Communist world production and requirements 427

Foreign uranium commitments by domestic producers as of January 1, 1975 428

Uranium delivery commitments, imports by domestic buyers as of January 1, 1975 429

U.S. reserves and resources:

Estimated uranium ore reserves, January 1, 1975 433

Estimated ore reserves by States, January 1, 1975 434

Potential resources, January 1, 1975 435

Uranium resources, January 1, 1975 437

Incremental distribution of reserves by grade and cutoff cost per pound for a typical sandstone type uranium deposit 438

Projected annual domestic requirements for 1988, 2000, and no breeder reactors 438

Indicators of trend of future U.S. uranium resource development 439

Exploration activity—reserve additions 440

Drilling activity and hole depths 441

U.S. production:

Uranium ore production—1974 445

Uranium concentrate production—1974 445

Distribution of 1973 U_3O_8 production in ore by open pit versus underground mine 446

Distribution of production sources 1973 446

U.S. mill production, uranium oxide (U_3O_8), 1960–73 447

Uranium mining districts 448

Producing U.S. uranium mines, January 1, 1975 449

Exploration/mining/milling factors associated with meeting contracted requirements for the operating plan (1975 through 1985) 450

Exploration/mining/milling factors associated with production to fill contracted requirements, operating plan through 1982, and case A growth requirements for 1983 through 1985 451

Comparison between production from $8 cutoff cost and $15 cutoff cost resources to meet 1981 requirements 452

Comparison of average mill sizes and production rates $8 resources versus $15 resources 453

Summary of exploration/mining/milling factors associated with production for three situations 454

U.S. demand:

Domestic production capability, delivery commitments and requirements, January 1, 1974 457

Forecast of domestic uranium requirements 458

Projected U.S. uranium oxide requirements, 1973–90 459

Annual domestic uranium delivery commitments, requirements and inventories 460

Cumulative domestic uranium commitments and requirements 461

Reported unfilled requirements, delivery commitments, potential deliveries and requirements 462

Projected annual domestic requirements for 1988, 2000 and no breeder reactors 463

Uranium delivery commitments domestic producers to domestic buyers 464

Average U_3O_8 prices, purchase contracts as of July 1, 1974 465

Uranium delivery commitments 466

Outstanding invitations to bid on uranium supply 467

Percentage of nuclear generating capacity with firm uranium supply arrangements 468

Uranium requirements for nuclear power 469

Drilling:

Surface drilling 473

Surface drilling data 474

1974 surface drilling by States 474

Drilling, reserve additions, and discovery rates at $8/lb U_3O_8 475

Page
Glossary — 479
List of abbreviations — 500
Conversion factors — 501
Introduction to index — 503
Index — 505

SOURCES[1]

1. The Edison Electric Institute, "Electric Power Survey," a report of the Electric Power Survey Committee of the Edison Electric Institute, October 1974, 50 pp.

2. American Petroleum Institute, "Quarterly Review of Drilling Statistics for the United States," Vol. VIII, No. 4, Annual Summary—1974, April 1975, 35 pp.

3. U.S. Department of the Interior, Bureau of Mines, "Coal—Bituminous and Lignite in 1973," prepared in Division of Fossil Fuels, January 4, 1975, 74 pp.

4. U.S. Department of the Interior, Geological Survey Circular 703, "Water Demands for Expanding Energy Development," by George H. Davis and Leonard A. Wood, National Center, Reston, Va. 22092, 1974, 14 pp.

5. Hudson, Edward A., and Dale W. Jorgenson. "Tax Policy and Energy Conservation." Discussion Paper No. 395. Harvard Institute of Economic Research, Harvard University, Cambridge, Mass., January 1975, 143 pp.

6. American Petroleum Institute, Annual Statistical Review, "Petroleum Industry Statistics 1964–1973," Division of Statistics, 1801 K Street NW., Washington, D.C. 20006, September 1974, 79 pp.

7. U.S. Department of the Interior, Bureau of Mines Circular 1972, "Energy Potential from Organic Wastes: A Review of the Quantities and Sources," U.S. Govt. Print. Off., Washington, D.C., 1972, 16 pp.

8. U.S. Department of the Interior, Bureau of Mines Mineral Industry Surveys, "Availability of Heavy Fuel Oils by Sulfur Levels," November 1974, 13 pp.

9. American Gas Association, "Gas Facts," a statistical record of the gas utility industry in 1973, 1515 Wilson Boulevard, Arlington, Va. 22209, 205 pp.

10. Federal Power Commission, National Gas Survey, "Total Energy Supply and Demand," preliminary draft issued in advance of Commission approval, April 22, 1975, 97 pp.

11. The American Association of Petroleum Geologists, Committee on Statistics of Drilling, preprint "North American Drilling Activity in 1974," by Fred J. Wagner, Tulsa, Okla. 74102, 28 pp.

12. Edison Electric Institute, "Statistical Year Book of the Electric Utility Industry for 1973," No. 41, publication No. 74–34, November 1974, 70 pp.

13. U.S. Energy Research and Development Administration, "ERDA Estimates U.S. Uranium Reserves," Information Bulletin No. 75–35, by James Griffin. Friday, March 21, 1975, 6 pp.

14. U.S. Energy Research and Development Administration, "U.S. Uranium Situation," by John A. Patterson, Chief, Supply Evaluation Branch, Division of Production and Materials Management, at the Atomic Industrial Forum Fuel Cycle Conference '75, Atlanta, Ga., March 20, 1975, 10 pp.

15. U.S. Atomic Energy Commission, Office of Assistant Director for Raw Materials, Division of Production and Materials Management, "Survey of United States Uranium Marketing Activity," Wash–1196 (74), April 1974, 23 pp.

16. World Oil, "Outlook '75," Forecast/Review Issue, February 15, 1975, 180 pp.

17. U.S. Department of the Interior, "Energy Perspectives," a presentation of major energy and energy-related data, by Herman Enzer, Walter Dupree, and Stanley Miller, U.S. Govt. Print. Off., Washington, D.C., February 1975, 207 pp.

18. U.S. Department of the Interior, Office of Coal Research, "Policy Analysis for Coal Development at a Wartime Urgency Level to Meet the Goals of Project Independence," by the Hudson Institute, February 4, 1974, 72 pp.

19. U.S. Energy Research and Development Administration, "National Plan for Solar Heating and Cooling" (Residential and Commercial Applications), Interim Report, Division of Solar Energy, Washington, D.C. 20545, March 1975, 119 pp.

20. U.S. Atomic Energy Commission, "AEC Survey Shows Increasing Uranium Prices," News Release, Grand Junction Office, Grand Junction, Colo. 81501, October 22, 1974, 3 pp.

21. Nininger, Robert D. "Uranium Resources." Remarks made at the American Institute of Chemical Engineers Annual Meeting, Salt Lake City, Utah, August 19–21, 1974, 18 pp. Mr. Nininger is Assistant Director for Raw Materials, Division of Production and Materials Management, U.S. Energy Research and Development Administration, Washington, D.C. 20545.

---

[1] All tables and graphs are referred to these numbered sources.

22. Patterson, John A. "Outlook for Uranium." Remarks made at the 17th Minerals Symposium of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Casper, Wyo., May 11, 1974, 10 pp. Mr. Patterson is Chief, Supply Evaluation Branch, Division of Production and Materials Management, U.S. Atomic Energy Commission.

23. Baranowski, F. P. "Supply and Demand Considerations in Uranium Enrichment." Remarks made before the Fuel Cycle Conference '75, Atlanta, Ga., March 21, 1975, 14 pp. Mr. Baranowski is Director, Division of Production and Materials Management, U.S. Energy Research and Development Administration.

24. U.S. Energy Research and Development Administration. "Uranium Enrichment Conference." Conf-750209, Oak Ridge, Tenn., February 13 and 14, 1975, 102 pp.

25. U.S. Atomic Energy Commission. "Uranium Industry Seminar." Grand Junction, Colo. 81501, October 22–23, 1974, part 1 of II, November 1974, 178 pp.

26. U.S. Energy Research and Development Administration. "Enhancement of Recovery of Oil and Gas." Progress Review No. 1, January 1975, 46 pp.

27. Electric Power Research Institute. "Research Progress Report FF-2." January 1975, 39 pp.

28. U.S. Department of the Interior, Bureau of Mines. "Crude Petroleum, Petroleum Products, and Natural Gas Liquids." Prepared by Division of Fossil Fuels, February 14, 1975, 46 pp.

29. U.S. Department of the Interior, Bureau of Mines. "Sales of Fuel Oil and Kerosene in 1973." Prepared by Division of Fossil Fuels, September 5, 1974, 14 pp.

30. U.S. Department of the Interior, Bureau of Mines. "Petroleum Refineries in the United States and Puerto Rico." Petroleum Refineries, Annual. Prepared July 22, 1974 by the Division of Fossil Fuels—Mineral Supply, 21 pp.

31. Federal Energy Administration. "Energy Information Reported to Congress as Required by Public Law 93–319." Quarterly Report, Fourth Quarter 1974, National Energy Information Center, Washington, D.C. 20461, 135 pp.

32. U.S. Energy Research and Development Administration. "LWR Spent Fuel Disposition Capabilities." 1975–84. Prepared by Savannah River Operations Office and Division of Production and Materials Management. March 1975, 26 pp.

33. U.S. Energy Research and Development Administration. "Survey of United States Uranium Marketing Activity." Division of Production and Materials Management, Office of Assistant Director for Raw Materials, April 1975, 26 pp.

34. U.S. Energy Research and Development Administration. "Nuclear Fuel Cycle." A report by the Fuel Cycle Task Force. March 1975, 59 pp.

35. U.S. Energy Research and Development Administration. "Trends in Refinery Capacity and Utilization, Petroleum Refineries in the United States, Foreign Refinery Exporting Centers." An interim update for U.S. portion only. December 1974, 15 pp.

36. U.S. General Acounting Office. "Federal Coal Research—Status and Problems To Be Resolved." Report to the Congress, by the Comptroller General of the United States, February 18, 1975, 95 pp.

37. U.S. Department of the Interior, Bureau of Mines. "International Coal Trade." ICT, v. 44, No. 3, March 1975, 38 pp.

38. The President's 1975 State of the Union Message including Economy and Energy.

39. "The Nuclear Industry 1974." WASH 1174–74. U.S Govt. Print. Off., Washington, D.C., 113 pp.

40. Linden, Henry R. "Some Interrelations among Energy Use, Standard of Living, and Employment." Institute of Gas Technology, 3424 South State Street, IIT Center, Chicago, Ill. 60616. April 22, 1975, 12 pp.

41. Linden, Henry R. "The Proper Role of Synthetic Fuels." Statement before the Subcommittee on Energy Research and Water Resources, Committee on Interior and Insular Affairs, U.S. Senate, March 3, 1975, 8 pp. plus exhibits.

42. Darmstadter, J. and S. H. Schurr. "World Energy Resources and Demand." Resources for the Future, Inc., Washington, D.C. Printed in Great Britain, Phil. Trans. R. Soc. Lond. A. 276, 413–430. 1974, 24 pp.

43. National Petroleum Council. U.S. Energy Outlook. "Gas Demand." A report by the Gas Demand Task Group of the Gas Subcommittee of the National Petroleum Council's Committee on U.S. Energy Outlook. 1973, 50 pp.

44. Federal Energy Administration. "Project Independence Blueprint." Final task force report prepared by the Interagency Task Force on Solar Energy under the direction of the National Science Foundation, November 1974.

THE PRESIDENT'S ENERGY PROGRAM

(SOURCE 38)

THE PRESIDENT'S ENERGY PROGRAM (INCLUDING ENERGY TAXES AND FEES)

The President's State of the Union Address outlined the Nation's energy outlook, set forth national energy policy objectives, and described actions he is taking immediately and indicated proposals he is asking the Congress to pass.

BACKGROUND

Over the past two years, progress has been made in conserving energy, expanding energy R&D and improving Federal government energy organization. Despite such accomplishments, we have not succeeded in solving fundamental problems and our National energy situation is critical. Our reliance on foreign sources of petroleum is contributing to both inflationary and recessionary pressures in the United States. World economic stability is threatened and several industrialized nations dependent upon imported oil are facing severe economic disruption.

With respect to the U.S. energy situation:

Petroleum is readily available from foreign sources—but at arbitrarily high prices, causing massive outflow of dollars, and at the risk of increasing our Nation's vulnerability to severe economic disruption should another embargo be imposed.

Petroleum imports remain at high levels even at present high prices.

Domestic oil production continues to decline as older fields are depleted and new fields are years from production; 8.8 million barrels per day in 1974 compared to 9.2 million in 1973.

Total U.S. petroleum consumption is increasing, although at slower rates due to higher prices.

Natural gas shortages are forcing curtailment of supplies to many industrial firms and denial of service to new residential customers. (14 percent expected this winter versus 7 percent last year.) This is resulting in unemployment, reductions in the production of fertilizer needed to increase food supplies, and increased demand for alternative fuels—primarily imported oil.

Coal production is at about the same level as in the 1930's.

Nuclear energy accounts for only 1 percent of total energy supply and new plants are being delayed, postponed or cancelled.

Overall energy consumption is beginning to increase again.

U.S. vulnerability to economic and social impact from an embargo increases with higher imports and will continue to do so until we reverse current trends, ready standby plans, and increase petroleum storage.

Economic impacts of the four-fold increase in OPEC oil prices include:

Heavy outflow of U.S. dollars (and in effect, jobs) to pay for growing oil imports—about $24 billion in 1974 compared to $2.7 billion in 1970.

Tremendous balance of payments deficits and possible economic collapse for those nations of Europe and Asia that must depend upon expensive imported oil as a primary energy source.

Accumulation of billions of dollars of surplus revenues in oil exporting nations—approximately $60 billion in 1974 alone.

U.S. ENERGY OUTLOOK

I. *Near-Term* (1975–1977): In the next 2–3 years, there are only a few steps that can be taken to increase domestic energy supply particularly due to the long lead time for new production. Oil imports will thus continue to rise unless demand is curbed.

II. *Mid-Term* (1975–1985): In the next ten years, there is greater flexibility. A number of actions can be taken to increase domestic supply, convert from foreign oil to domestic coal and nuclear energy, and reduce demand—if the Nation takes tough actions. Vulnerability to an embargo can be eliminated.

III. *Long-Term* (Beyond 1985): Emerging energy sources can play a bigger role in supplying U.S. needs—the results of the Nation's expanded energy research and development program. U.S. independence can be maintained. New technologies are the most significant opportunity for other consuming nations with limited domestic resources.

NATIONAL ENERGY POLICY GOALS AND PRINCIPLES ANNOUNCED BY THE PRESIDENT

I. *Near-Term* (1975–1977): Reduce oil imports by 1 million barrels per day by the end of 1975 and 2 million barrels by the end of 1977, through immediate actions to reduce energy demand and increase domestic supply.

(A) With no action, imports would be about 8 million barrels per day by the end of 1977, more than 20 percent above the 1973 pre-embargo levels.

(B) Acting to meet the 1977 goal will reduce imports below 1973 levels, assuring reduced vulnerability from an embargo and greater consumer nation cooperation.

(C) More drastic short-term reductions would have unacceptable economic impacts.

II. *Mid-Term* (1975–1985): Eliminate vulnerability by achieving the capacity for full energy independence by 1985. This means 1985 imports of no more than 3–5 million barrels of oil per day, all of which can be replaced immediately from a strategic storage system and managed with emergency measures.

(A) With no action, oil imports by 1985 could be reduced to zero at prices of $11 per barrel or more—or they could go substantially higher if world oil prices are reduced (e.g., at $7 per barrel, U.S. consumption could reach 24 million barrels per day with imports of above 12 million, or above 50 percent of the total.)

(B) The U.S. anticipates a reduction in world oil prices over the next several years. Hence, plans and policies must be established to achieve energy independence even at lower prices—countering the normal tendency to increase imports as the price declines.

(C) Actions to meet the 1985 goal will hold imports to no more than 3–5 million barrels per day even at $7 per barrel prices. Protection against an embargo of the remaining imports can then be handled most economically with storage and standby emergency measures.

III. *Long-Term* (Beyond 1985): Within this century, the U.S. should strive to develop technology and energy resources to enable it to supply a significant share of the Free World's energy needs.

(A) Other consuming nations have insufficient fossil fuel resources to reach domestic energy self-sufficiency.

(B) The U.S. can again become a world energy supplier and foster world energy price stability—much the same as the nation did prior to the 1960's when it was a major supplier of world oil.

IV. *Principles:* Actions to achieve the above national energy goals must be based upon the following principles:

Provide energy to the American consumer at the lowest possible cost consistent with our need for secure energy supplies.

Make energy decisions consistent with our overall economic goals.

Balance environmental goals with energy requirements.

Rely upon the private sector and market forces as the most efficient means of achieving the Nation's goals, but act through the government where the private sector is unable to achieve our goals.

Seek equity among all our citizens in sharing of benefits and costs of our energy program.

Coordinate our energy policies with those of other consuming nations to promote interdependence, as well as independence.

ACTIONS ANNOUNCED BY THE PRESIDENT

I. Actions announced by the President to meet near-term goals (1975–1977)

To meet the national goals, the President outlined a comprehensive program of legislative proposals to the Congress which he requested be enacted within 90 days and administrative actions that he will begin implementing immediately. The legislative package is more effective and equitable than the administrative program, but the President indicated that the seriousness of the situation demanded immediate action. These actions will reduce overall energy demand, increase domestic production, increase conversion to coal, and reduce oil imports. They include:

(A) Administrative actions

1. *Import Fee.*—Because of the seriousness of the problem and because time is required for Congressional action on his legislative proposals, the President is acting immediately within existing authorities to increase the import fees on

crude oil and petroleum products. These new import fees would be modified upon passage of the President's legislative package.

(a) Import fees on crude oil and petroleum products under the authority of the Trade Expansion Act of 1962, as amended, will be increased by $1 effective February 1, 1975, an additional $1 effective March 1; and another $1 effective April 1, for a total increase of $3.00 per barrel. Currently existing fees will also remain in effect.

(b) FEA's "Old Oil Entitlements" program will be utilized to spread price increases on crude among all refiners and to lessen disproportionate regional effects, particularly in the Northeast.

(c) As of February 1975, product imports will cease to be covered by FEA's "Old Oil Entitlements" program. In order to overcome any severe regional impacts that could be caused by large fees in import dependent areas, imported products will receive a rebate corresponding to the benefit which would have been obtained under that program. The rebate should be approximately $1.00 in February, $1.40 in March, and $1.80 per barrel in April.

(d) This import fee program would reduce imports by about 500,000 barrels per day. In April it would generate about $400 million per month in revenues.

2. *Backup Import Control Program.*—The energy conservation measures and tax proposals will be supplemented by the use of Presidential power to limit oil imports as necessary to achieve the near-term goals.

3. *Crude Oil Price Decontrol.*—To stimulate production and further cut demand, steps will be taken to remove price controls on domestic crude oil by April 1, 1975, subject to congressional disapproval as provided by § 4(g) of the Emergency Petroleum Allocation Act of 1973.

4. *Increase Public Education on Energy Conservation.*—Energy Resources Council will step up its efforts to provide information on energy conservation methods and benefits.

(B) Legislative proposals

1. *Comprehensive Tax and Decontrol Program.*—The President asked the Congress to pass within 90 days a comprehensive legislative package which could lead to reduction of oil imports of 900,000 barrels per day by 1975 and 1.6 million barrels by 1977. Average oil prices would rise about $4.00 per barrel of $.10 per gallon. The package which will raise $30 billion in revenues on an annual basis includes:

(a) *Windfall profits tax.*—A tax on all domestic crude oil to capture the windfall profits resulting from price decontrol. The tax would take 88% of the windfall profits on crude oil and would phase out over several years. The tax would be retroactive to January 1, 1975.

(b) *Petroleum excise tax and import fee.*—An excise tax on all domestic crude oil of $2 per barrel and a fee on imported crude oil and product imports of $2 per barrel. The new, administratively established import fee of $3 on crude oil would be reduced to $2.00 and $1.20 fee on products would be increased to $2.00 when the tax is enacted. The product import fee would keep the excise tax from encouraging foreign refining and the related loss of jobs to the U.S.

(c) *New natural gas deregulation.*—Remove Federal interstate price regulation on new natural gas to increase domestic production and reduce demand for scarce natural gas supplies.

(d) *Natural gas excise tax.*—An excise tax on natural gas of 37¢ per thousand cubic feet (mcf), which is equivalent on a Btu basis to the $2 per barrel petroleum excise tax and fee. This will discourage attempts to switch to natural gas and acts to reduce natural gas demand curtailments. Since the usual results of gas curtailments is a switch to oil, this will limit the growth of oil imports.

2. *Elk Hills Naval Petroleum Reserve.*—The President is asking the Congress to permit production of the Elk Hills Naval Petroleum Reserve (NPR No. 1) under Navy control. Production could reach 160,000 barrels per day early in 1975 and 300,000 barrels per day by 1977. The oil produced would be used to top off Defense Department storage tanks, with the remainder sold at auction or exchanged for refined petroleum products used by the Department of Defense. Revenues would be used to finance further exploration, development and production of the Naval petroleum reserves and the strategic petroleum storage.

3. *Conversion to the Use of Domestic Coal.*—The President is asking the Congress to amend the Clean Air Act and the Energy Supply and Environmental Coordination Act of 1974 to permit a vigorous program to make greater use of domestic coal to reduce the need for oil. This program would reduce the need for oil imports by 100,000 barrels per day in 1975 and 300,000 barrels in 1977. These amendments would extend FEA's authority to grant prohibition orders from 1975 to 1977, prohibit powerplants early in the planning process from burning oil and gas, extend FEA enforcement authority from 1978 to 1985, and make clear that coal burning installations that had originally planned to convert from coal to oil be eligible for compliance date extensions. It would give EPA authority to extend compliance dates and eliminate restrictive regional environmental limitations. A plant could convert as long as its own emissions do not exceed ambient air quality standards.

II. Actions announced by the President to meet mid-term goals (1975–1985)

These actions are designed to meet the goal of achieving the capability for energy independence by 1985. The actions include measures to increase domestic energy production (including measures to cope with constraints and strike a balance between environmental and energy objectives), reduce energy demand, and prepare for any future emergency resulting from an embargo.

(A) Supply Actions

1. *Naval Petroleum Reserve No. 4 (Legislative proposal).*—The President is asking the Congress to authorize the exploration, development and production of NPR–4 in Alaska to provide petroleum for the domestic economy, with 15–20 percent earmarked for military needs and strategic storage. The reserves in NPR–4 which are now largely unexplored could provide at least 2 million barrels of oil per day by 1985. Under the legislative proposal:

(a) The President would be authorized to explore, develop, and produce NPR–4.

(b) The Government's share of production (approximately 15–20 percent) would be used to help finance the strategic storage system and to help fulfill military petroleum requirements. Any other receipts go to the United States Treasury as miscellaneous receipts.

2. *OCS Leasing (Administrative).*—The President reaffirmed his intention to continue an aggressive Outer Continental Shelf leasing policy, including lease sales in the Atlantic, Pacific, and Gulf of Alaska. Decisions on individual lease sales will await completion of appropriate environmental studies. Increased OCS leasing could add domestic production of 1.5 million barrels of oil and additional supplies of natural gas by 1985. There will be close cooperation with Coastal states in their planning for possible increased local development. Funding for environmental studies and assistance to States for planning has been increased in fiscal year 1975.

3. *Reducing Domestic Energy Price Uncertainty (Legislative proposal).*—Legislation will be requested authorizing and requiring the President to use tariffs, import quotas, import price floors, or other measures to achieve domestic energy price levels necessary to reach self-sufficiency goals. This legislation would enable the President to cope with possible large-scale fluctuations in world oil prices.

4. *Clean Air Act Amendments (Legislative proposal).*—In addition to the amendments outlined earlier for short-term goals, the President is asking for other Clean Air Act amendments needed for a balance between environmental and energy goals. These include:

(a) Legislative clarification to resolve problems resulting from court decisions with respect to significant air quality deterioration in areas already meeting health and welfare standards.

(b) Extension of compliance dates through 1985 to implement a new policy regarding stack gas scrubbers—to allow use of intermittent control systems in isolated power plants through 1985 and requiring other sources to achieve control as soon as possible.

(c) A pause for 5 years (1977–1981 model years) for nationwide auto emission standards at the current California levels for hydrocarbons (0.9 grams per mile) and carbon monoxide (9 grams per mile), and at 1975 standards (3.1 grams per mile) for oxides of nitrogen (with the exception of California which has adopted the 2.0 standard). These standards for hydrocarbons (HC) and carbon monoxide (CO) are more stringent than now required nationwide for 1976 model year's cars. The change from the levels now required for 1977–1981 model years in the law will have no significant impact on air quality standards, yet they will facilitate attainment of the goal of 40 percent increase in auto fuel efficiency by the 1980 model year.

(d) EPA will shortly begin comprehensive hearings on emission controls and fuel economy which will provide more detailed data for Congressional consideration.

5. *Surface Mining (Legislative proposal).*—The President is asking the Congress to pass a surface mining bill which strikes a balance between our desires for reclamation and environmental protection and our need to increase domestic coal production substantially over the next ten years. The proposed legislation will correct the problems which led to the President's veto of a surface mining bill last year.

6. *Coal Leasing (Administrative).*—To assure rapid production from existing leases and to make new, low sulfur coal supplies available, the President directed the Secretary of the Interior to:

(a) Adopt legal diligence requirements to assure timely production from existing leases.

(b) Meet with Western Governors to explore regional questions on economic, environmental and social impacts associated with new Federal coal leases.

(c) Design a program of new coal leasing consistent with timely development and adequate return on public assets, if proper environmental safeguards can be provided.

7. *Electric Utilities.*—The President is asking the Congress for legislation concerned with utilities. In recent months, 60 percent of planned nuclear capacity and 30 percent of non-nuclear capacity additions have been postponed or cancelled by electric utilities. Financing problems are worsening and State utility commission practices have not assured recovery of costs and adequate earnings. The transition from oil and gas-fired plants to coal and nuclear has been slowed greatly—contributing to pressure for higher oil imports. Actions involve:

(a) *Uniform investment tax credit (legislative).*—An increase in the investment tax credit to eliminate the gap between utilities and other industries—currently a 4 percent rate applies to utilities and 7 percent to others.

(b) *Higher investment tax credit (legislative).*—An increase in investment tax credit for all industry, including utilities, for 1 year—to 12 percent. The 12 percent rate would be retained for two additional years for all power plants except oil and gas-fired facilities.

(c) *Preferred stock dividend deductions (legislative).*—A change in tax laws applicable to all industries, including utilities, which allows deductions of preferred stock dividends for tax purposes to reduce the cost of capital and stimulate equity rather than debt financing.

(d) *Mandated reform of State utility commission processes (legislative).*—The legislation would selectively reform utility commission practices by: (1) setting a maximum limit of 5 months for rate or service proceedings; (2) require fuel adjustment pass-throughs, including taxes; (3) requiring that construction work in progress be included in a utility's rate base; (4) removing any rules prohibiting a utility from charging lower rates for electric power during off-peak hours and (5) allowing the cost of pollution control equipment to be included in the rate base.

(e) *Energy Resources Council study (administrative).*—Review and report to the President on the entire regulatory process and financial situation relating to electric utilities and determine what further reforms or actions are needed. ERC will consult with State utility commissions, governors, public utilities and consumers.

8. *Nuclear Power.*—To accelerate the growth of nuclear power which supplies only one percent of our energy needs, the President is proposing, in addition to actions outlined above:

(a) *Expedited licensing and siting (legislative).*—A Nuclear Facility Licensing Act to assure more rapid siting and licensing of nuclear plants.

(b) *1976 budget increase (legislative).*—An increase of $41 million in appropriations for nuclear safety, safeguards, and waste management.

9. *Energy Facilities Siting (legislative).*—Legislation would reduce energy facility siting bottlenecks and assure sites for needed facilities with proper land use considerations:

(a) The legislation would require that states have a comprehensive and coordinated process for expeditious review and approval of energy facility applications; and state authorities which ensure that final State energy facility decisions cannot be nullified by actions of local governments.

(b) Provision for owners of eligible facilities or citizens to sue States for inaction.

(c) Provide no Federal role in making case by case siting decisions for the States.

(b) *Energy conservation actions*

The President announced a number of energy conservation measures to reduce demand, including:

1. *Auto Gasoline Mileage Increases* (*Administrative*).—The Secretary of Transportation has obtained written agreements with each of the major domestic automobile manufacturers which will yield a 40 percent improvement in fuel efficiency on a weighted average for all new autos by 1980 model year. These agreements are contingent upon relaxation of Clean Air Act auto emission standards. The agreement provides for interim goals, Federal monitoring and public reporting of progress.

2. *Building Thermal Standards* (*Legislative*).—The President is asking Congress for legislation to establish national mandatory thermal (heating and cooling) efficiency standards for new homes and commercial buildings which would save the equivalent of over one-half million barrels of oil per day by 1985. Under this legislation:

(a) The Secretary of Housing and Urban Development shall consult with engineering, architectural, consumer, labor, industry, and government representatives to advise on development of efficiency standards.

(b) Thermal standards for one and two-family dwellings will be developed and implementation would begin within one year. New minimum performance standards for energy in commercial and residential buildings would be developed and implemented as soon thereafter as practicable.

(c) Standards would be implemented by State and local governments through local building codes.

(d) The President also directed the Secretary of Housing and Urban Development to include energy conservation standards in new mobile home construction and safety standards.

3. *Residential Conservation Tax Credit.*—The President is asking Congress for legislation to provide incentives to homeowners for making thermal efficiency improvements in existing homes. This measure, along with a stepped-up public information program, could save the equivalent of over 500,000 barrels per day by 1985. Under this legislation:

(a) A 15 percent tax credit retroactive to January 1, 1975 for the cost of certain improvements in thermal efficiency in residences would be provided. Tax credits would apply to the first $1,000 of expenditures and can be claimed during the next three years.

(b) Improvements such as storm windows, and insulation, would qualify for the tax credit.

4. *Low-Income Energy Conservation Program* (*Legislative*).—The President is proposing legislation to establish a Low-Income Energy Conservation Program to offer direct subsidies to low-income and elderly homeowners for certain energy conservation improvements such as insulation. The program is modeled upon a successful pilot program in Maine.

(a) The program would be administered by FEA, under new legislation, and the President is requesting supplemental appropriations in 1975 and $55 million in fiscal year 1976.

(b) Acting through the States, Federal funds would be provided to purchase materials. Volunteers or community groups could install the materials.

5. *Appliance Efficiency Standards* (*Administrative*).—The President directed the Energy Resources Council to develop energy efficiency goals for major appliances and to obtain agreements within six months from the major manufacturers of these appliances to comply with the goals. The goal is a 20% average improvement by 1980 for all major appliances, including air conditioners, refrigerators and other home appliances. Achievement of these goals would save the equivalent of over one-half million barrels of oil per day by 1985. If agreement cannot be reached, the President will submit legislation to establish mandatory appliance efficiency standards.

6. *Appliance and Auto Efficiency Labelling Act* (*Legislative*).—The President will ask the Congress to enact a mandatory labelling bill to require that energy efficiency labels be placed on new appliances and autos.

(C) Emergency preparedness

The President announced that comprehensive energy emergency legislation will be proposed, encompassing two major components.

1. *Strategic Petroleum Storage (Legislative)*.—Development of an energy storage system of one billion barrels for domestic use and 300 million barrels for military use. The legislation will authorize the government to purchase and prepare the storage facilities (salt domes or steel tanks), while complex institutional questions are resolved and before oil for storage is actually purchased. FEA will develop the overall program in cooperation with the Department of the Interior and the Department of Defense. All engineering, planning, and environmental studies would be completed within one year. The 1.3 billion barrels will not be complete for some years, since time is required to purchase, prepare, and fill the facilities.

2. *Standby and Planning Authorities (Legislative)*.—The President is requesting a set of emergency standby authorities to be used to deal with any significant future energy shortages. These authorities would also enable the United States to fully implement the agreement on an International Energy Program between the United States and other nations signed on November 18, 1974. This legislation would include the authority to:

(a) implement energy conservation plans to reduce demand for energy;
(b) allocate petroleum products and establish price controls for allocated products;
(c) ration fuels among end users;
(d) allocate materials needed for energy production where such materials may be in short supply;
(e) increase production of domestic oil; and
(f) regulate petroleum inventories.

III. Actions announced by the President to meet long-term goals (beyond 1985)

The expanded research and development program on which the nation is embarked will provide the basis for increasing domestic energy supplies and maintaining energy independence. It will also make it possible in the long run for the U.S. to export energy supplies and technology to others in the free world. Important elements are:

(A) *Synthetic Fuels Program (Administrative)*.—The President announced a National Synthetic Fuels Commercialization Program to ensure at least one million barrels per day equivalent of synthetic fuels capacity by 1985, using technologies now nearing commercial application.

1. Synthetic fuel types to be considered will include synthetic crude from oil shale and a wide range of clean solid, liquid, and gaseous fuels derived from coal.

2. The Program would entail Federal incentives (possibly including price guarantees, purchase agreements, capital subsidies, leasing programs, etc.), granted competitively, and would be aimed at the production of selected types of gaseous and liquid fuels from both coal and oil shale.

3. The program will rely on existing legislative authorities, including those contained in the Federal Non-Nuclear Energy Research and Development Act of 1974, but new legislative authorities will be requested if necessary.

(B) *Energy Research and Development Program*.—In the current fiscal year, the Federal Government has greatly increased its funding for energy research and development programs. These Federal programs are a part of a much larger national energy R & D effort and are carried out in cooperation with industry, colleges and universities and others. The President stated that his 1976 Budget will continue to emphasize these accelerated programs which include research and the development of technology for energy conservation and on all forms of energy including fossil fuels, nuclear fission and fusion, solar and geothermal.

(C) *Energy Research and Development Administration*.—(ERDA) The President has signed an Executive Order which activates, effective January 19, 1975, the Energy Research and Development Administration. ERDA will bring together in a single agency the major Federal energy R & D programs which will have the responsibility for leading the national effort to develop technology to assure that the U.S. will have an ample and secure supply of energy at reasonable prices. ERDA consolidates major R & D functions previously handled by the AEC, Department of the Interior, National Science Foundation and Environmental Protection Agency. ERDA will also continue the basic research, nuclear materials production and weapons programs of the AEC.

IMPACTS OF NEAR AND MID-TERM ACTIONS ON PETROLEUM CONSUMPTION AND IMPORTS

NEAR TERM PROGRAM

[In millions of barrels per day]

	1975	1977
Consumption if no new actions	18.0	18.3
Imports if no new actions	6.5	8.0
Import savings:		
Less service savings by short-term actions:		
Production from Elk Hills	.2	.3
Coal conversion	.1	.3
Tax package	.9	1.6
Total import savings	1.2	2.2
Remaining imports	5.3	5.8

MID-TERM PROGRAM

	Million barrels per day
Consumption if no new actions	23.9
Imports if no new actions	12.7

	1985 impact on imports
Less savings achieved by following actions:	
OCS leasing	1.5
NPR-4 development	2.0
Coal conversion	.4
Synthetic fuel commercialization	.3
Auto efficiency standards	1.0
Continuation of taxes	2.1
Appliance efficiency goals	.1
Insulation tax credit	.3
Thermal standards	.3
Total import savings by actions	8.0
Remaining imports	4.7
Less:	
Emergency storage	3.0
Standby authorities	1.7
Net import vulnerability	0

INTERNATIONAL ENERGY POLICY AND FINANCING ARRANGEMENTS

BACKGROUND

The cartel created by the Organization of Petroleum Exporting Countries (OPEC) has successfully increased their governments' price for exports of oil from approximately $2 barrel in mid 1973 to $10 per barrel today. Even after paying for their own increased imports, OPEC nations will report a surplus of over $60 billion in 1974, which must be invested. Oil price increases have created serious problems for the world economy. Inflation pressures have been intensified. Domestic economies have been disrupted. Consuming nations have been reluctant to borrow to finance their oil purchases because of current balance of payments risks and the burden of future interest costs and the repayment of massive debts. International economic relations have been distorted by the large flows of capital and uncertainties about the future.

U.S. POSITION

The United States believes that the increased price of oil is the major international economic problem and has proposed a comprehensive program for reducing the current exorbitant price. Oil importing nations must cooperate to reduce consumption and accelerate the development of new sources of energy in order to create the economic conditions for a lower oil price. However, until the price of oil does decline, international stability must be protected by financing facilities to assure oil importing nations that financing will be available on reasonable terms to pay for their oil imports. The United States is active in developing these financing programs. Once a cooperative program for energy conservation and resource development and the interim financing arrangements are agreed upon, it will be possible to have constructive meetings with the oil producers.

ACTIONS TAKEN BY OIL CONSUMING NATIONS

The oil consuming nations have already created the International Energy Agency to coordinate conservation and resource development programs and policies for reacting to any future interruption of oil exports by producing nations. The four major elements of this cooperative program are:

An emergency sharing arrangement to immediately reduce member vulnerability to actual or threatened embargoes by producers;

A long-term cooperative program to reduce member nation dependence on imported oil;

A comprehensive information system designed to improve our knowledge about the world oil market and to provide a basis for consultations among members and individual companies; and

A framework for coordinating relations with producing nations and other less developed consuming countries.

The International Energy Agency has been established as an autonomous organization under the OECD. It is open to all OECD nations willing and able to meet the obligations created by the program. This international agreement establishes a number of conservation and energy resources development goals but each member is left free to determine what domestic measures to use in achieving the targets. This flexibility enables the United States to coordinate our national and international energy goals.

OTHER U.S. ACTIONS AND PROPOSALS

The United States has also supported programs for protecting international stability against distorting financial flows created by the sudden increase of oil prices. Although the massive surplus of export earnings accumulated by the producing nations will have to be invested in the oil consuming nations, it is unlikely that these investments will be distributed so as to match exactly the financing needs of individual importing nations. Fortunately the existing complex of private and official financial institutions has, in the case of the industrialized countries, been effective in redistributing the massive oil export earnings to date. However, there is concern that some individual industrialized nations may not be able to continue to obtain needed funds at reasonable interest rates and terms during the transition period until supplies are increased, conservation efforts reduce oil imports and the price of oil declines. Therefore, the United States has supported various proposals for "reshuffling" the recycled funds among oil consuming nations, including:

Modification of International Monetary Fund (IMF) rules to permit more extensive use of existing IMF resources without further delay;

Creation of a financial solidarity facility as a "safety net" for participating OECD countries that are prepared to cooperate in an effort to increase conservation and energy resource development actions to create pressure to reduce the present price of oil;

Establishment of a special trust fund managed by the IMF which would extend balance of payments assistance to the most seriously affected developing nations on a concessional basis not now possible under IMF rules. The United States hopes that oil exporting nations might contribute a major share of the trust fund and that additional resources might be provided through the sale of a small portion of the IMF's gold holdings in which the differential between the original cost of the gold and the current market price would be added to the trust fund; and

An increase in IMF quotas which would make more resources available in 1976.

These proposals will be discussed at ministerial level meetings of the Group of Ten, the IMF Interim Committee and the International Monetary Fund/International Bank for Reconstruction and Development Committee in Washington, D.C., January 14 to 17.

In these meetings, the United States will continue to press its views concerning the fundamental importance of international cooperation to achieve necessary conservation and energy resources development goals as a basis for protecting our national security and underlying economic strength.

THE UNITED STATES ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

AND

OTHER ORGANIZATIONS ESTABLISHED BY PUBLIC LAW 93-438

53-136 O - 75 - 3

The Energy Research and Development Administration (ERDA)

POLICY BACKGROUND OF ERDA

Rationale for Creation of ERDA.—The energy crisis of 1973 was the impetus for general agreement in the Executive Branch and the Congress that the United States must act on several fronts to assure an adequate energy supply for the Nation's general welfare and common defense and security. One of these fronts was a recognition of the potential contribution that research and development could make to utilize new energy sources and improve and conserve existing ones, while taking into account economically competitive and environmentally acceptable requirements. An accelerated energy R & D program over an initial 5-year period was undertaken and Project Independence, to achieve United States self-sufficiency in energy by 1980, was announced.

Energy research and development activities were scattered throughout more than a dozen departments and agencies. With the vastly increased Federal funds being directed to this effort, unified and strong direction of R & D activities was deemed imperative in order to achieve established goals.

The consolidation of these activities into an Energy Research and Development Administration by the Energy Reorganization Act of 1974 Public Law 93-438, approved October 11, 1974, was the practicable organizational response. ERDA was originally proposed as a component of a comprehensive Department of Energy and Natural Resources (DENR), but was separated out to be acted on independently in 1973, when it became apparent that the broader DENR concept would require prolonged consideration by the Congress before it could be approved.

In all, the Energy Reorganization Act of 1974 directed the establishment of three new organizations to consolidate and coordinate Federal energy R & D functions and to provide a separate focus for nuclear regulatory and safety functions. They are:

Energy Research and Development Administration (a new Executive Branch independent agency);

Nuclear Regulatory Commission (an independent regulatory commission in the Executive Branch); and

Energy Resources Council (an interim coordinating and advisory body in the Executive Office of the President).

ENERGY FUNCTIONS TRANSFERRED TO ERDA

Energy functions transferred as delineated in Public Law 93-438 are as follows:

the civilian energy, military development and production, and physical, biomedical and environmental research programs of the former Atomic Energy Commission;

the functions of the Office of Coal Research; all fossil fuel energy research and development programs of the six Bureau of Mines energy centers[1] and the synthane pilot plant for high BTU coal conversion at Bruceton, Pa.; and functions relating to underground electric power transmission research, from the Department of the Interior;

all functions relating to solar heating and cooling development and geothermal power development, for which the National Science Foundation is responsible; and

the research, development and demonstration programs on alternative automotive power systems, from the Environmental Protection Agency, but not assessment or monitoring functions for regulatory purposes.

OTHER ORGANIZATIONS ESTABLISHED BY PUBLIC LAW 93-438

Nuclear Regulatory Commission.—Title II of Public Law 93-438 directed the establishment of a five-member independent regulatory commission, known as the Nuclear Regulatory Commission, responsible for the regulatory, licensing, and safety functions of the former Atomic Energy Commission under the Atomic Energy Act of 1954, and those added by this act.

---

[1] The 6 energy centers are located at Bartlesville, Okla.; Grand Forks, N. Dak.; Laramie, Wyo.; Morgantown, W. Va.; Pittsburgh, Pa.; and San Francisco, Calif.

Energy Resources Council.—The Energy Resources Council, a high-level interim coordinating and advisory body for all Federal agencies with responsibilities in energy policy or energy resources, was authorized by section 108 of Public Law 93-438 and activated by Executive Order 11814 of October 11, 1974. Present membership of the Council, located in the Executive Office of the President, consists of the Secretary of the Interior, designated by the President as Chairman, and 16 other department or agency heads and other designated officers.[2]

---

[2] These are: Administrator of FEA; Administrator of ERDA; Secretary of State; Director, OMB; Assistant to the President for Economic Affairs; Secretary of the Treasury; Secretary of Defense; the Attorney General; Secretary of Commerce; Secretary of Transportation; Chairman of the AEC (until it is abolished); Chairman of CEA; Administrator, EPA; Chairman, SEQ; Director, NSF; and Executive Director, Domestic Council. Under his authority to designate additional members, the President has added the Secretary, Department of Housing and Urban Development, and the Director, Office of Consumer Affairs.

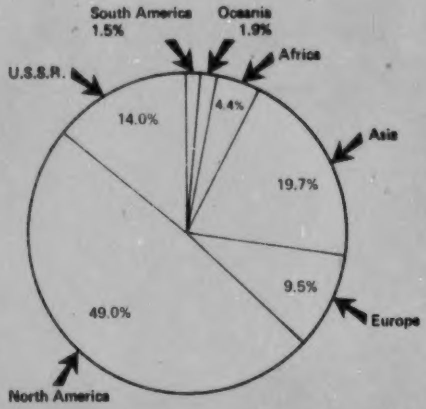
UNITED STATES AND FOREIGN ENERGY STATISTICS
RESOURCES

(Source 17)

World Recoverable Energy Reserves

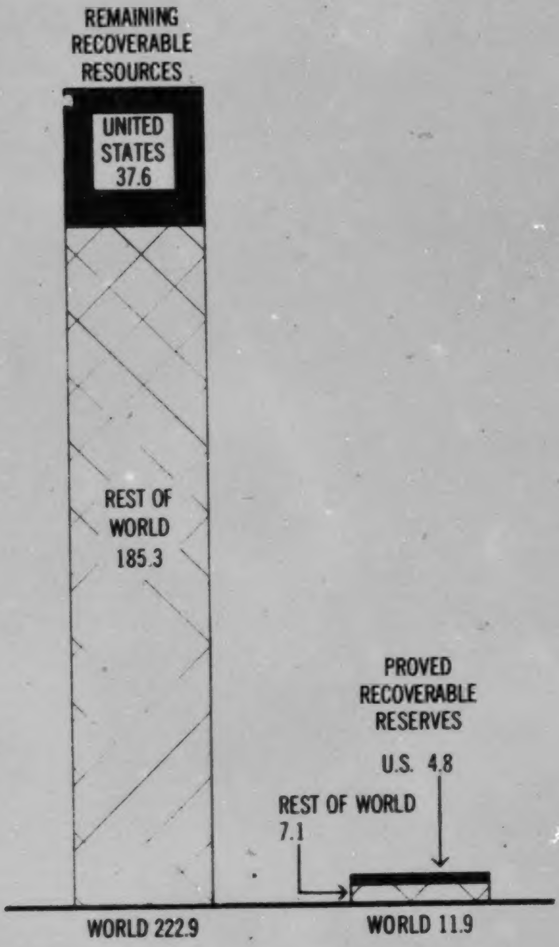
(Quadrillion Btu)

TOTAL: 31,173



(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR COMMERCIAL ENERGY RESOURCES
(Quintillion BTU)



(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR FINITE COMMERCIAL ENERGY RESOURCES

Energy Equivalent in Quintillion British Thermal Units (Q Btu)
and Percentage Contribution (%)

	Natural Gas			Petroleum & Nat. Gas Liquids			Coal			Uranium (U_3O_8)			Total		
	Q Btu	% ↓	% →	Q Btu	% ↓	% →	Q Btu	% ↓	% →	Q Btu 1/	% ↓	% →	Q Btu	% ↓	% →
Remaining Recoverable Resources 2/															
United States	2.4	15		2.7	20		31.1	16		1.4	41		37.6	17	
Rest of World	13.9	85		10.9	80		158.5	84		2.0	59		185.3	83	
World	16.3	100	7.3	13.6	100	6.1	189.6	100	85.1	3.4	100	1.5	222.9	100	100
Proved Recoverable Reserves 3/															
United States	.3	16		.2	6		4.1	68		.2	33		4.8	40	
Rest of World	1.6	84		3.2	94		1.9	32		.4	67		7.1	60	
World	1.9	100	16.0	3.4	100	28.6	6.0	100	50.4	.6	100	5.0	11.9	100	100

1/ The Btu value of uranium U_3O_8 is based on the thermal efficiency of U_3O_8 use in conventional light water reactors, operated at a plant factor of 7%, and with an average heat rate of 10,250 Btu/Kwh, or at 33% efficiency. Theoretical maximum energy equivalent of U_3O_8 is approximately 120 times greater.

2/ Estimated remaining recoverable resources, discovered and undiscovered, that could be made available under certain economic and technological conditions.

3/ Proved reserves are those recoverable under existing economic and operating conditions, at current prices and under existing technology.

Source: Tables 6-4 to 5-8.

Prepared by: Office of Economics, Federal Power Commission.

(Source 17)

Measured World Nonrenewable Energy Reserves

(Quadrillion Btu)[1]

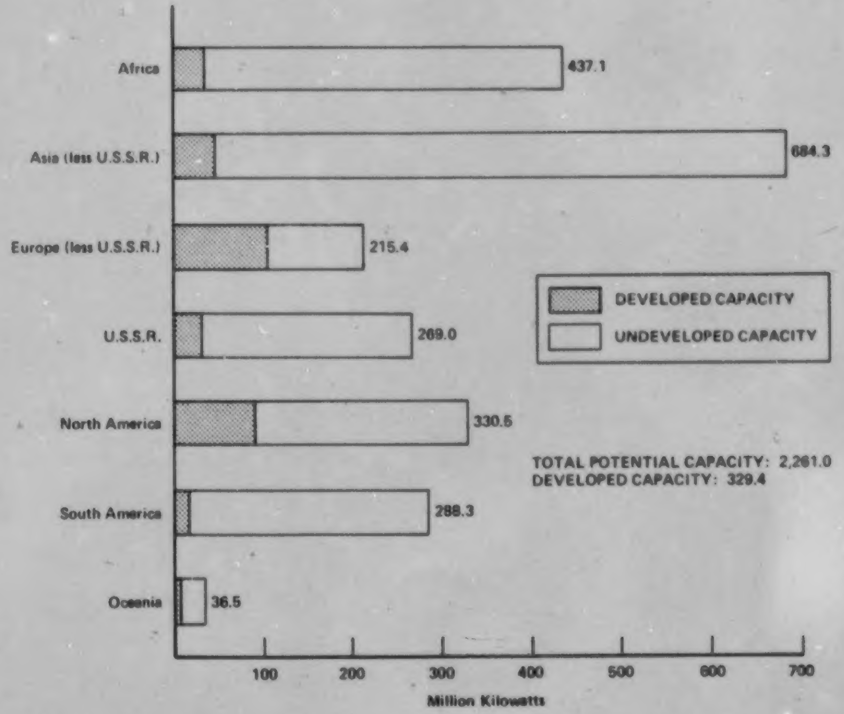
AREA	FOSSIL FUELS				URANIUM (nonbreeders)	TOTAL
	SOLID FUELS	CRUDE OIL	NATURAL GAS	OIL SHALE AND TAR SANDS		
AFRICA	361.7	526.6	201.7	81.4	198.1	1,369.5
ASIA (less U.S.S.R.)	2,608.7	2,211.4	432.6	870.2	3.1	6,126.0
EUROPE (less U.S.S.R.)	2,581.5	57.1	153.6	117.0	46.4	2,955.6
U.S.S.R.	3,325.5	333.6	577.9	139.0	Unknown	>4,376.0
NORTH AMERICA[2]	5,070.9	301.0	380.6	9,111.0[2]	422.7	15,286.2
SOUTH AMERICA	49.8	311.5	60.6	23.7	11.9	457.5
OCEANIA	459.8	9.4	24.9	9.2	99.1	602.4
TOTAL	14,457.9	3,741.2	1,831.9	10,351.5	>781.3	>31,173.2

[1] 1 Quadrillion Btu = 500,000 barrels petroleum per day for a year
= 40 million tons of bituminous coal
= 1 trillion cubic feet of natural gas
= 100 billion kWh (based on a 10,000-Btu/kWh heat rate)

[2] According to the Bureau of Mines, North American tar sands and oil shale reserves may be severely overstated. Development of most of these reserves is not economic at the present time.

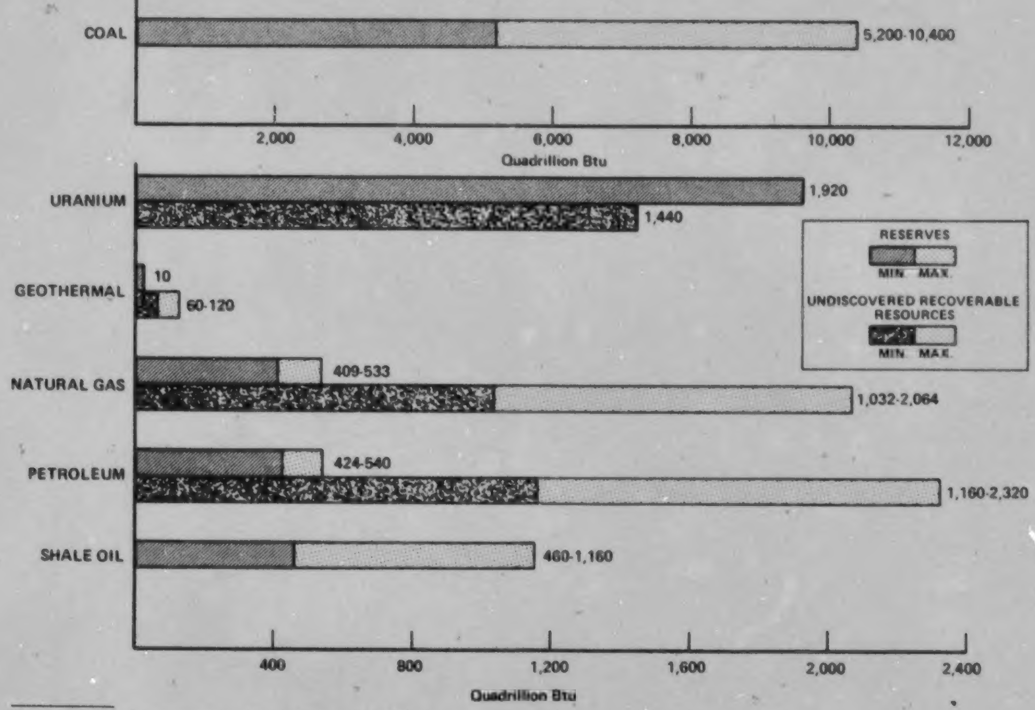
(Source 17)

World Hydroelectric Power, Developed and Undeveloped, 1973



U.S. Recoverable Energy Resources

(Source 17)



---

[1] Uranium recoverable resources are based upon U_3O_8 prices of $50 a pound of less. The energy content was evaluated in relationship to the lightwater reactor, and assumed to be 400 x 10^9 Btu per ton.

PRODUCTION

(Source 12)

WORLD POWER DATA
TEN COUNTRIES WITH GREATEST INSTALLED CAPACITY
1972*

	Country	Installed Capacity (Kw in Thousands)			Energy Production (Kwhr in Millions)			Population†† (Thousands)	Kwhr per Capita
		Hydro	Thermal	Total	Hydro	Thermal	Total		
1.	United States**	56 566	343 040	399 606	272 734	1 474 589	1 747 323†	208 842‡	8 367
2.	USSR	34 846	151 393	186 239	122 900	734 536	857 435	247 459	3 465
3.	Japan	20 765	64 531	85 296	88 658	325 633	414 291	106 958	3 873
4.	United Kingdom	2 158	73 288	75 446	4 305	259 376	263 681	55 788	4 726
5.	Germany (West)	4 839	52 778	57 617	13 689	261 080	274 769	61 674	4 455
6.	Canada	32 500	17 444	49 944	178 169	59 458	237 627	21 848	10 876
7.	France	15 800	28 200	44 000	48 417	114 995	163 412	51 700	3 161
8.	Italy	15 945	21 099	37 044	45 402	89 528	134 930	54 345	2 483
9.	Spain	11 450	8 550	20 000	36 520	32 390	68 910	34 494	1 998
10.	China (Mainland)	4 600	12 900	17 500	39 400	66 600	106 000	800 721	132

* Preliminary.

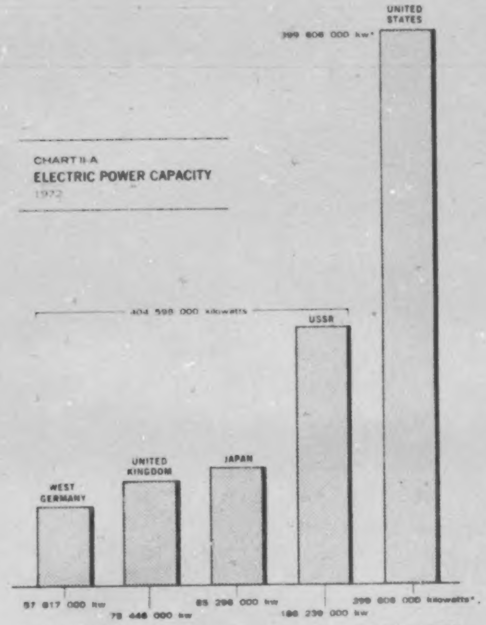
** Including Alaska and Hawaii.

† Net imports not included.

‡ U. S. population includes armed forces abroad.

†† Population for Japan as of March 31, 1972, for all other countries as of July 1, 1972.

Source: Federal Power Commission.



(Source 17)

Energy inputs for world electrical generation increased at an annual rate of 7.6 percent between 1960 and 1972, and are projected to increase at an annual rate of 6.4 percent between 1972 and 1990.

Nuclear energy is expected to be the fastest-growing energy input during the 1972-90 period, increasing at an annual rate of 23.6 percent. In 1990, nuclear energy is projected to provide 37 percent of total energy inputs for world electrical generation.

Given business as usual, $11 oil, nuclear energy is projected to provide 41 percent of total U.S. electrical generation in 1990.

World Energy Inputs, Electrical Sector, 1960-90

(Quadrillion Btu)[1]

YEAR	FOSSIL FUELS	HYDROPOWER & GEOTHERMAL	NUCLEAR	TOTAL
1960	16.1	6.9	---	23.0
1965	24.4	9.6	0.2	34.2
1970	36.6	11.8	.8	49.2
1972	41.6	12.8	1.4	55.8
1980	63.0	15.4	12.6	91.0
1985	73.3	17.1	33.6	124.0
1990	87.6	18.8	63.6	170.0

[1] 1 Quadrillion Btu = 500,000 barrels petroleum per day for a year
= 40 million tons of bituminous coal
= 1 trillion cubic feet of natural gas
= 100 billion kWh (based on a 10,000-Btu/kWh heat rate)

(Source 5)

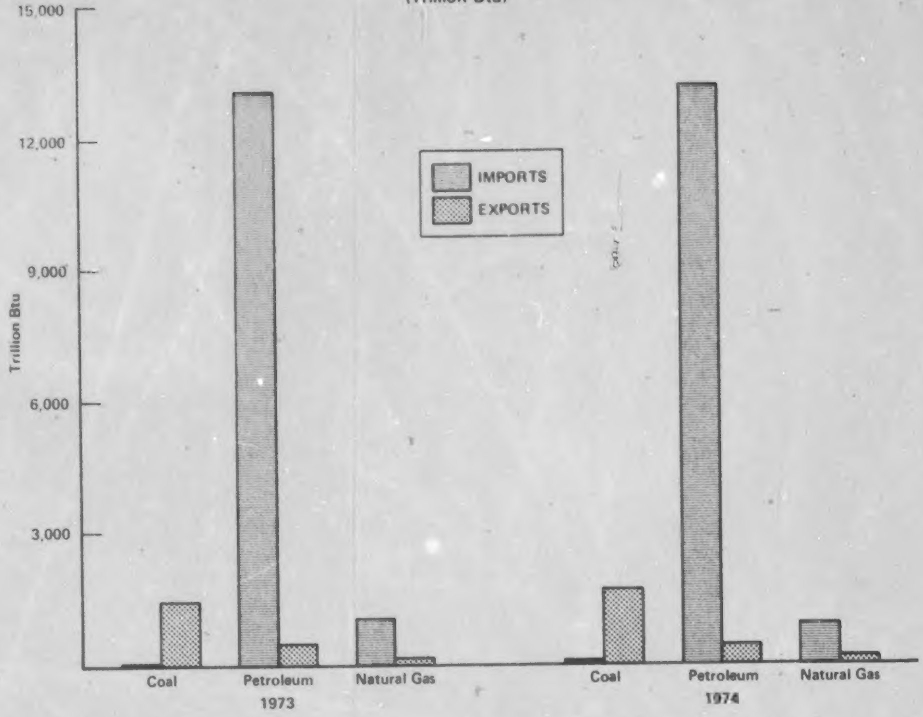
U.S. Energy Supply, 1970-2000

	1970	1975	1980	1985	1990	2000
Coal (million short tons)						
Production	598	656	707	828	972	1260
Exports	72	84	89	104	112	129
U.S. consumption	525	572	618	724	860	1131
Petroleum (million barrels a day)						
U.S. crude output (including gas liquids)	11.56	10.60	13.90	17.60	19.00	20.60
U.S. output of shale oil	0	0	0	0	0.81	4.29
Imports	3.42	6.42	5.78	4.97	5.58	5.73
U.S. consumption	14.70	16.77	19.45	22.35	25.20	30.49
Exports	0.26	0.25	0.23	0.22	0.19	0.13
Gas (billion cubic feet)						
U.S. output of natural gas	20616	21862	22512	23541	23941	23662
U.S. output of synthetic gas	0	0	0	690	1796	3640
Imports	821	2210	3444	3526	3621	3814
U.S. consumption	21367	23991	25898	27714	29325	31098
Exports	70	81	58	44	33	18
Total (quadrillion Btu)						
U.S. energy input	67.444	77.230	90.414	105.804	122.897	163.383
Exports	2.610	2.667	2.672	2.961	3.043	3.297
Total demand	70.054	79.897	93.086	108.765	125.940	166.680
Imports	8.235	15.917	15.890	14.235	15.688	16.100
Supplemental (synthetic gas, shale oil)	0	0	0	0.690	3.428	12.284
Imports as percentage of total demand	11.76	19.92	17.07	13.09	12.46	9.66
Supplemental as percentage of total demand	0	0	0	0.01	2.72	7.37

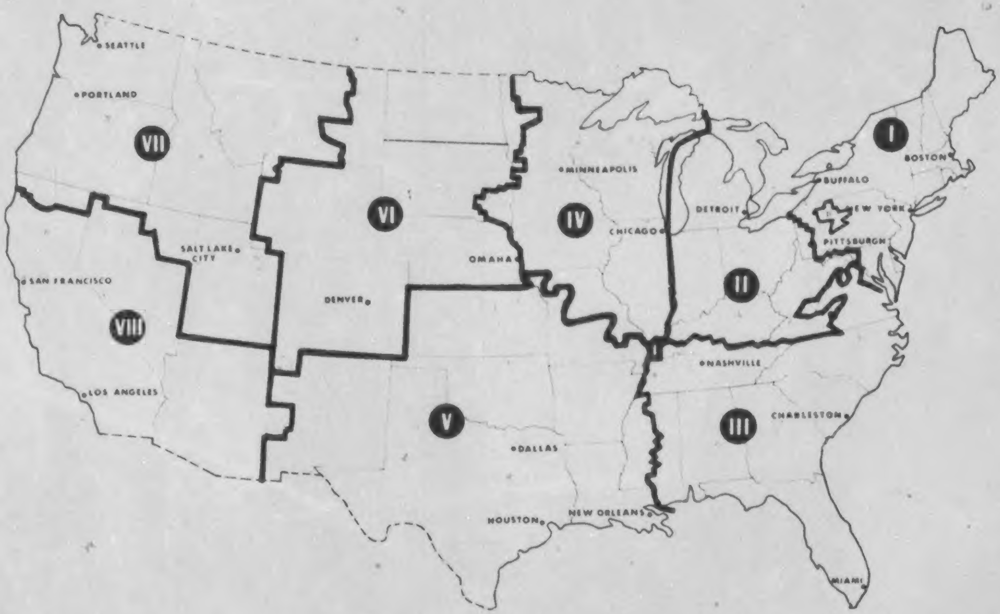
(Source 17)

U.S. Energy Trade

(Trillion Btu)



(Source 1)


SEATTLE
PORTLAND
VII
SALT LAKE CITY
SAN FRANCISCO
VIII
LOS ANGELES
VI
DENVER
OMAHA
MINNEAPOLIS
IV
CHICAGO
DETROIT
II
NASHVILLE
V
DALLAS
HOUSTON
NEW ORLEANS
III
CHARLESTON
MIAMI
I
BOSTON
BUFFALO
NEW YORK
PITTSBURGH

POWER SUPPLY REGIONS
AS DEFINED BY THE FEDERAL POWER COMMISSION

(Source 1)

FOSSIL FUEL REQUIREMENTS FOR ELECTRIC GENERATION IN PHYSICAL UNITS

	Actual 1973	1974	1975	1976	1977	1978	1979
Gross Coal Requirements in Physical Units (Thousands of Tons)							
Region I	42,145	44,197	43,377	42,855	43,563	44,976	48,805
Region II	139,280	141,119	145,701	147,703	154,677	160,386	159,662
Region III	98,428	98,521	106,023	109,500	112,898	115,958	120,279
Region IV	66,009	67,735	73,162	78,504	85,663	90,882	94,975
Region V	11,883	14,938	18,575	23,573	35,652	54,902	76,835
Region VI	14,455	15,498	18,734	22,587	24,741	26,776	31,303
Region VII	7,791	10,226	14,113	17,511	19,713	22,225	26,213
Region VIII	10,788	12,267	15,068	18,107	20,410	23,431	26,644
Survey Total for the Eight Regions	390,779	404,501	434,753	460,340	497,097	539,736	584,716
Gross Oil Requirements in Physical Units (Thousands of Barrels)							
Region I	293,519	254,194	257,202	274,946	285,156	301,202	304,112
Region II	25,517	28,299	29,960	29,704	29,003	28,524	28,110
Region III	116,679	120,062	130,377	128,431	133,215	139,730	153,020
Region IV	16,694	16,216	13,110	12,468	19,321	27,150	26,252
Region V	33,819	40,539	55,776	76,589	88,273	90,146	95,116
Region VI	845	1,236	1,761	2,122	2,269	3,283	3,760
Region VII	870	3,066	5,090	5,133	5,244	4,880	6,970
Region VIII	82,884	95,427	168,403	186,753	192,870	208,342	220,829
Survey Total for the Eight Regions	570,827	559,039	661,679	716,146	755,351	803,257	838,167
Gross Gas Requirements in Physical Units (Millions of Cubic Feet)							
Region I	104,407	66,244	18,361	14,556	29,104	29,167	29,215
Region II	65,046	73,429	62,647	60,493	59,344	58,535	57,738
Region III	248,515	211,719	162,100	145,521	134,767	126,720	104,977
Region IV	160,334	129,803	51,382	28,787	15,475	14,375	9,191
Region V	2,142,180	2,151,641	2,226,844	2,283,415	2,271,858	2,272,610	2,196,599
Region VI	106,055	95,815	56,305	37,213	28,452	21,818	14,816
Region VII	8,184	8,983	9,279	9,925	9,295	9,135	9,135
Region VIII	519,288	297,973	173,490	76,990	40,589	29,656	22,776
Survey Total for the Eight Regions	3,354,009	3,035,607	2,760,408	2,656,898	2,588,884	2,561,966	2,442,447

(Source 1)

NET GENERATION BY SOURCE, FUELS AND HYDRO—MILLIONS OF KILOWATT-HOURS

	Actual 1973	1974	1975	1976	1977	1978	1979
Region I							
Coal	102,867	105,507	102,607	100,852	103,872	107,039	115,992
Oil	159,181	139,606	146,317	160,452	167,419	177,818	179,576
Gas	7,967	5,089	1,397	1,112	2,335	2,339	2,339
Nuclear	25,382	43,879	69,125	81,052	99,442	104,689	118,315
Hydro, adverse conditions	42,900	39,582	38,680	38,704	39,447	39,123	39,329
Other	517	638	273	715	728	689	682
Pumping Energy (deduct)	4,610	5,015	6,097	6,460	6,394	7,175	7,387
Total Net Generation	334,204	329,286	352,802	376,627	406,299	424,519	449,846
Region II							
Coal	297,010	302,818	311,855	316,738	328,505	342,726	341,781
Oil	10,655	11,806	12,520	12,413	12,110	11,905	11,732
Gas	5,652	5,938	5,432	5,247	5,146	5,075	5,005
Nuclear	4,250	13,533	18,841	31,247	27,772	42,275	63,489
Hydro, adverse conditions	3,749	5,979	5,979	5,979	6,312	6,312	6,977
Other	—	—	—	—	—	—	—
Pumping Energy (deduct)	1,117	4,469	4,469	4,469	4,653	4,653	5,651
Total Net Generation	320,199	335,605	350,158	367,155	385,192	403,642	423,333

continued on page 34

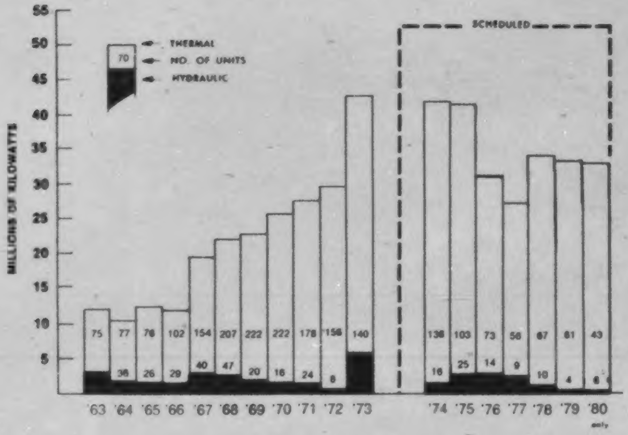
(Continued)— **NET GENERATION BY SOURCE, FUELS AND HYDRO—MILLIONS OF KILOWATT-HOURS**

	Actual 1973	1974	1975	1976	1977	1978	1979
Region III							
Coal	228,795	230,378	251,667	260,712	271,418	280,625	289,794
Oil	67,060	88,305	75,893	74,712	78,162	82,735	90,672
Gas	22,994	19,266	15,064	13,890	13,067	12,270	10,171
Nuclear	17,768	37,429	63,498	92,658	116,765	145,313	172,016
Hydro, adverse conditions	42,266	38,152	31,791	32,554	33,121	33,546	35,420
Other	—	—	—	—	—	—	—
Pumping Energy (deduct)	18	376	734	1,635	2,430	2,773	4,684
Total Net Generation	378,865	391,154	437,179	472,891	510,103	551,716	593,189
Region IV							
Coal	131,382	134,269	144,746	156,494	170,072	179,396	187,052
Oil	6,836	6,851	5,664	5,686	9,354	13,630	13,059
Gas	12,323	10,037	3,749	2,015	967	817	542
Nuclear	29,273	35,512	49,708	53,539	54,112	54,882	63,322
Hydro, adverse conditions	4,199	3,666	3,495	3,519	3,535	3,579	3,569
Other	1,266	829	610	614	610	610	800
Pumping Energy (deduct)	331	216	191	81	96	181	153
Total Net Generation	184,947	190,949	207,781	221,786	238,554	252,733	268,191
Region V							
Coal	18,731	23,580	29,375	37,659	57,151	88,083	124,048
Oil	19,737	23,885	32,969	45,692	52,268	53,113	55,891
Gas	198,692	213,700	223,698	232,967	229,207	228,780	220,861
Nuclear	—	1,891	5,027	4,930	11,248	10,994	18,114
Hydro, adverse conditions	895	3,342	3,289	3,289	3,290	3,290	3,330
Other	—	—	—	—	—	—	—
Pumping Energy (deduct)	—	—	—	—	—	—	—
Total Net Generation	238,055	266,398	295,177	324,537	353,164	384,260	422,244
Region VI							
Coal	21,028	22,237	27,339	32,340	36,283	39,545	45,875
Oil	629	569	733	925	989	1,430	1,638
Gas	8,349	7,744	4,612	2,881	2,129	1,632	1,142
Nuclear	603	4,656	8,076	10,228	10,222	9,869	10,023
Hydro, adverse conditions	11,950	11,784	10,519	10,047	9,976	9,859	9,883
Other	88	71	13	—	—	—	—
Pumping Energy (deduct)	429	401	380	321	440	440	440
Total Net Generation	42,218	46,660	50,872	56,100	59,159	61,895	68,121
Region VII							
Coal	12,808	16,934	24,661	30,684	34,912	39,658	46,870
Oil	352	1,422	2,309	2,244	2,274	2,109	3,181
Gas	624	760	747	794	753	763	743
Nuclear	4,432	4,500	5,430	11,112	11,856	11,323	13,691
Hydro, adverse conditions	113,366	108,859	110,921	114,242	114,161	116,908	115,603
Other	33	33	33	33	33	33	33
Pumping Energy (deduct)	—	30	30	30	30	30	30
Total Net Generation	131,595	132,458	143,871	159,079	163,959	170,764	180,091
Region VIII							
Coal	20,639	24,310	30,223	37,064	41,407	47,282	53,685
Oil	51,325	58,314	104,723	115,977	120,066	129,662	137,077
Gas	54,229	30,[illegible]	17,942	7,807	3,960	2,799	2,069
Nuclear	2,691	4,[illegible]	11,748	17,058	23,182	25,237	27,307
Hydro, adverse conditions	43,389	51,948	28,161	28,577	28,651	28,711	28,868
Other	2,863	3,418	4,748	4,784	6,765	7,863	8,468
Pumping Energy (deduct)	—	236	385	385	385	403	403
Total Net Generation	175,136	173,011	197,160	210,882	223,626	241,171	257,071
Survey Total for the Eight Regions							
Coal	833,260	860,033	922,273	972,543	1,043,570	1,124,356	1,205,097
Oil	315,575	308,758	381,147	418,301	442,662	472,422	492,626
Gas	311,030	293,501	272,641	266,713	257,544	254,455	242,872
Nuclear	84,398	145,671	232,213	301,824	364,999	404,582	486,277
Hydro, adverse conditions	262,694	263,312	232,835	236,911	238,493	241,328	242,979
Other	4,767	4,989	6,177	6,146	8,136	9,215	9,983
Pumping Energy (deduct)	6,505	10,743	12,286	13,381	14,928	15,658	18,748
Total Net Generation*	1,805,219	1,865,521	2,035,000	2,189,057	2,340,056	2,490,700	2,661,086

*These kilowatt-hours represent approximately 98 percent of the kilowatt-hour requirements shown under "Survey Total for the Eight Regions" in Table IV. The difference is accounted for mainly by net imports across international boundaries, purchases by utilities from industrial generating plants, and kilowatt-hour data for which fuel data were not available.

(Source 1)

NEW CAPACITY PLACED IN COMMERCIAL OPERATION IN THE CONTIGUOUS UNITED STATES 1963-1973 AND THAT ON ORDER AND SCHEDULED FOR SERVICE IN THE COMING YEARS AS OF OCTOBER 1, 1974
Units 4,000 Kw and Larger



(Source 12)

GENERATION BY FUEL—TOTAL ELECTRIC UTILITY INDUSTRY

BY STATES AND KINDS OF FUEL

YEAR 1973—KILOWATT-HOURS IN MILLIONS

	Total Thermal*	Coal	Fuel Oil	Gas	Nuclear Fuel
Total United States	**1 575 936**	**845 986**	**310 657**	**336 001**	**83 292**
Maine	6 000	—	2 649	—	3 351
New Hampshire	3 810	2 748	1 051	11	—
Vermont	1 777	52	85	42	1 598
Massachusetts	33 386	30	27 807	428	5 121
Rhode Island	1 194	—	1 193	1	—
Connecticut	20 659	58	16 299	—	4 302
New England	*66 826*	*2 888*	*49 084*	*482*	*14 372*
New York	76 286	13 507	50 049	5 503	7 227
New Jersey	36 524	6 415	24 496	2 028	3 585
Pennsylvania	102 521	91 398	10 584	178	361
Middle Atlantic	*215 331*	*111 320*	*85 129*	*7 709*	*11 173*
Ohio	99 836	97 217	1 576	1 043	—
Indiana	59 029	57 824	455	750	—
Illinois	92 406	63 712	5 488	3 155	20 051
Michigan	59 603	47 090	6 032	3 647	2 834
Wisconsin	29 961	21 276	609	2 124	5 952
East North Central	*340 835*	*287 119*	*14 160*	*10 719*	*28 837*
Minnesota	20 416	11 763	906	4 477	3 270
Iowa	14 622	9 594	165	4 863	—
Missouri	36 866	32 302	321	4 243	—
North Dakota	5 394	5 370	7	17	—
South Dakota	743	391	80	272	—
Nebraska	8 276	2 877	164	4 635	600
Kansas	17 521	1 792	540	15 189	—
West North Central	*103 838*	*64 089*	*2 183*	*33 696*	*3 870*
Delaware	5 801	2 336	3 247	218	—
Maryland	25 439	10 188	14 664	587	—
District of Columbia	3 305	465	2 840	—	—
Virginia	34 418	12 475	14 804	282	6 857
West Virginia	56 033	55 709	306	18	—
North Carolina	55 072	50 658	3 723	691	—
South Carolina	24 016	13 312	2 429	2 109	6 166
Georgia	31 738	25 696	3 322	2 720	—
Florida	76 148	14 541	42 187	14 739	4 681
South Atlantic	*311 970*	*185 380*	*87 522*	*21 364*	*17 704*
Kentucky	49 126	48 334	76	716	—
Tennessee	48 072	46 757	117	1 198	—
Alabama	44 241	43 476	302	190	273
Mississippi	11 027	2 879	3 073	5 075	—
East South Central	*152 466*	*141 446*	*3 568*	*7 179*	*273*
Arkansas	8 443	—	4 305	4 138	—
Louisiana	40 704	—	4 353	36 351	—
Oklahoma	24 881	3	69	24 809	—
Texas	133 115	6 527	3 560	123 028	—
West South Central	*207 143*	*6 530*	*12 287*	*188 326*	—
Montana	1 567	1 303	69	195	—
Idaho	1	—	1	—	—
Wyoming	8 845	8 697	57	91	—
Colorado	13 237	8 603	300	4 334	—
New Mexico	19 393	13 026	408	5 959	—
Arizona	10 346	958	4 079	5 309	—
Utah	2 511	2 091	132	288	—
Nevada	12 175	8 017	177	3 981	—
Mountain	*68 075*	*42 695*	*5 223*	*20 157*	—
Washington	8 889	4 275	182	—	4 432
Oregon	239	—	12	227	—
California	93 867	—	46 050	45 186	2 631
Pacific	*102 995*	*4 275*	*46 244*	*45 413*	*7 063*
Alaska	1 392	244	192	956	—
Hawaii	5 065	—	5 065	—	—
Alaska & Hawaii	*6 457*	*244*	*5 257*	*956*	—

* Excludes generation by geothermal, wood and waste.
p Preliminary.
Source: Federal Power Commission.

(Source 9)

ANNUAL PRODUCTION OF MINERAL ENERGY RESOURCES AND ELECTRICITY FROM HYDROPOWER AND NUCLEAR POWER IN THE UNITED STATES, 1950-1973

(Trillions of Btu)[a]

Year	Natural Gas Wet (un-processed)	Crude Petroleum	Bituminous Coal and Lignite	Anthracite Coal	Water Power[b]	Nuclear[c]	Grand Total Energy
1950	6,841	11,449	13,527	1,120	1,573	–	34,510
1955	10,304	14,410	12,170	665	1,407	–	38,956
1956	10,920	15,181	13,133	730	1,543	–	41,510
1957	11,871	15,178	12,900	664	1,534	–	41,826
1958	11,963	14,204	10,734	538	1,693	–	39,133
1959	13,036	14,933	10,795	534	1,639	–	40,937
1960	13,822	14,935	10,886	478	1,578	5	41,704
1961	14,691	15,105	10,590	403	1,693	17	42,499
1962	15,365	15,495	11,069	420	1,774	23	44,146
1963	16,271	15,761	12,034	464	1,741	33	46,304
1964	16,980	16,164	12,759	436	1,801	38	48,343
1965	17,628	16,521	13,417	378	2,033	38	50,015
1966	18,980	16,925	13,507	329	2,063	57	51,861
1967	20,087	18,100	13,984	311	2,307	88	54,879
1968	21,540	18,593	13,666	291	2,349	130	56,575
1969	22,838	18,886	13,957	266	2,648	146	58,741
1970	24,154	19,773	14,820	247	2,630	229	61,853
1971	24,805	19,322	13,389[R]	222	2,835	404	60,963[R]
1972	24,878	19,344	14,319	181	2,864	576	62,104
1973p	25,218	18,749	14,190	165	2,869	853	62,044

a. The unit heat values employed are: Anthracite, 12,700 Btu per pound; bituminous coal and lignite, 12,180 Btu per pound; petroleum approx. 5,800,000 Btu per barrel, obtained by using 5,248,000 for gasoline, 5,670,000 for kerosene, 5,825,000 for distillate, 6,287,000 for residual, 6,065,000 for lubricants, 5,537,000 for wax, 6,636,000 for asphalt and 5,796,000 miscellaneous; natural gas dry 1031 Btu per cubic foot; natural gas liquids obtained by using 110,000 Btu per gallon for natural gasoline, 95,000 Btu per gallon for LP gas and ethane at 73,390 Btu per gallon.

b. Hydropower output is converted to theoretical energy inputs calculated from national average heat rates for fossil-fueled steam-electric plants obtained from the Federal Power Commission.

c. Nuclear power energy input conversion is based on information from the Atomic Power Commission.

p – Preliminary

Source: U.S. Bureau of Mines, *Natural Gas Annual*, 1973.

R – Revised

ANNUAL PRODUCTION OF MINERAL ENERGY RESOURCES AND ELECTRICTY FROM HYDROPOWER AND NUCLEAR POWER IN THE UNITED STATES, 1950-1973

(Percentage)

Year	Natural Gas Wet (un-processed)	Crude Petroleum	Bituminous Coal and Lignite	Anthracite Coal	Water Power	Nuclear	Grand Total Energy
1950	19.8	33.2	39.2	3.2	4.6	–	100.0
1955	26.5	37.1	31.3	1.7	3.7	–	100.0
1956	26.3	36.6	31.6	1.8	3.7	–	100.0
1957	27.7	36.3	30.9	1.5	3.6	–	100.0
1958	30.5	36.3	27.5	1.4	4.3	–	100.0
1959	31.8	36.5	26.4	1.3	4.0	–	100.0
1960	33.2	35.8	26.1	1.1	3.8	a	100.0
1961	34.7	35.8	24.8	1.0	3.7	a	100.0
1962	34.8	35.1	25.0	1.0	4.0	0.1	100.0
1963	35.1	34.0	26.0	1.0	3.8	0.1	100.0
1964	35.2	33.5	26.4	0.9	3.9	0.1	100.0
1965	35.2	33.0	26.8	0.8	4.1	0.1	100.0
1966	36.6	32.6	26.1	0.6	4.0	0.1	100.0
1967	36.6	33.0	25.4	0.6	4.3	0.1	100.0
1968	38.1	32.8	24.2	0.5	4.2	0.2	100.0
1969	38.9	32.2	23.8	0.4	4.5	0.2	100.0
1970	39.0	32.0	24.0	0.4	4.2	0.4	100.0
1971	40.6	31.7	22.0	0.4	4.6	0.7	100.0
1972	40.0	31.1	23.1	0.3	4.6	0.9	100.0
1973p	40.6	30.2	22.9	0.3	4.6	1.4	100.0

a Less than 0.05

p – Preliminary

Source: U.S. Bureau of Mines, *Natural Gas Annual*, 1973.

(Source 31)

-Daily average U.S. domestic production of fossil fuels

Month	1974				1973			
	Coal[1]	Crude oil[2]	NGL	Natural gas[3]	Coal[1]	Crude oil[2]	NGL	Natural gas[3]
Year	1,616	8,771	1,686	60.21	1,621	9,187	1,738	62.05
Dec.	1,235	8,471	1,725	60.97	1,570	9,044	1,729	62.13
Nov.	1,029	8,458	1,740	60.67	1,661	9,144	1,774	62.10
Oct.	1,894	8,568	1,686	59.52	1,754	9.172	1,756	62.10
Sept.	1,749*	8,621	1,638	58.70	1,611	9,077	1,741	60.48
Aug.	1,622	8,681	1,676	57.97	1,802	9,161	1.748	61.16
July	1,543	8,754	1,657	58.94	1,413*	9,195	1,737	60.65

[1] Thousands of tons.
[2] Thousands of barrels (includes lease condensate).
[3] Natural gas marketed production (billion of cubin feet).

*Revised

Note: NGL (Natural gas liquids) for November & December 1974 estimated.

Sources: Coal-1974, FEA;

(Source 31).

-Daily average U.S. domestic production of fossil fuels, in trillion Btu

Month	1974					1973				
	Coal	Crude oil	NGL	Natural gas	Total	Coal	Crude oil	NGL	Natural gas	Total
Year	38.8	50.9	6.8	62.2	158.7	38.9	53.3	7.0	64.4	163.6
Dec.	29.7	49.1	7.0	62.8	148.6	37.7	52.4	7.0	63.9	161.0
Nov.	24.7	49.0	7.0	62.8	143.5	39.9	53.0	7.2	63.9	164.0
Oct.	45.5	49.7	6.8	59.7	161.7	42.1	53.2	7.1	62.8	165.2
Sept.	42.0*	50.0	6.6	60.8*	159.4*	38.7	52.6	7.0	62.8*	161.1*
Aug.	39.0	50.3	6.8	59.7*	155.8*	43.3	53.1	7.1	62.8	166.3*
July	37.1	50.8	6.7	60.8	155.8*	33.9*	53.3	7.0	62.8	157.0*

*Revised

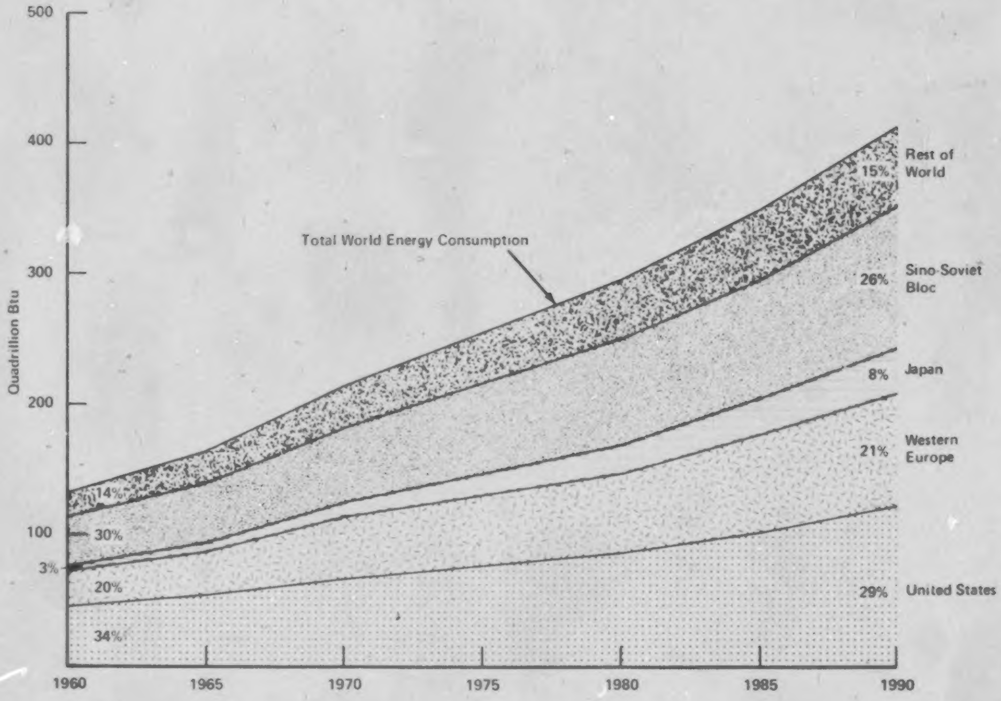
Note: Conversion factors: crude oil-5.8 MM Btu/b; natural gas-1.03 MM Btu/1000 cu. ft.; natural gas liquids-4.05 MM Btu/b; coal produced-24.01 MM Btu/ton; coal exported-26.90 MM Btu/ton.

Sources: Crude oil and coal-1974, FEA; other data from Bureau of Mines.

CONSUMPTION AND DEMAND

(Source 17)

World Energy Consumption by Region, 1960-90



(Source 17)

From 1960 to 1972, total world energy consumption increased at an annual rate of 4.9 percent. The projected annual rate of increase from 1972 to 1990 is 3.3 percent.

From 1972 to 1990, U.S. energy consumption is projected to increase 3 percent annually as compared to a 4.1-percent growth rate for the 1960-72 period.

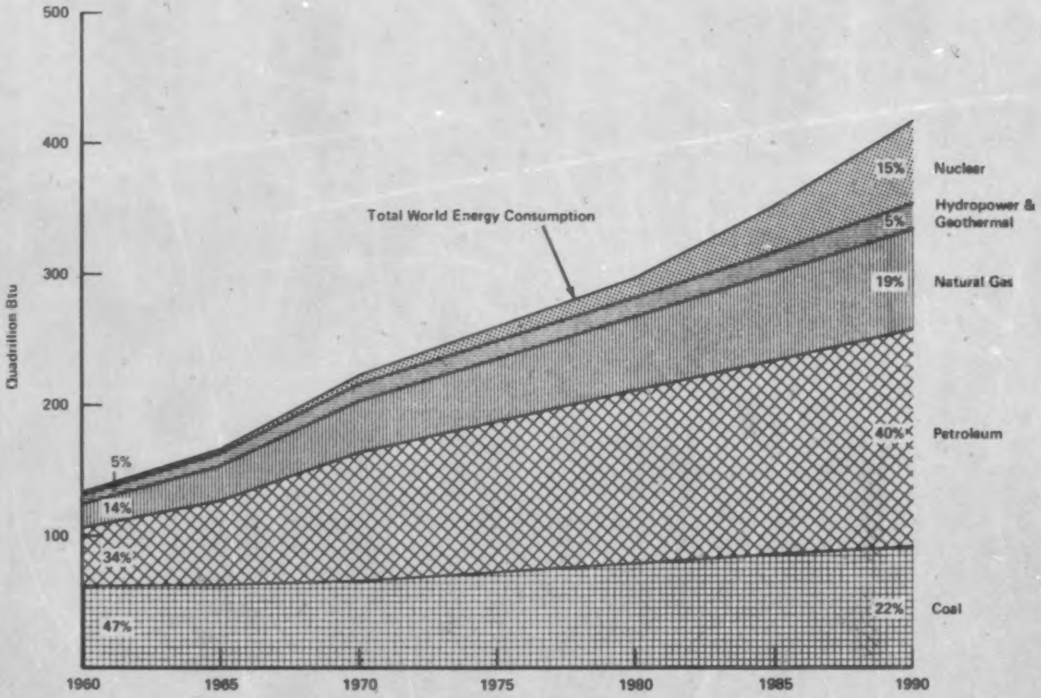
World Energy Consumption, by Region, 1960-90
(Quadrillion Btu)[1]

REGION	1960	1965	1970	1972	1980	1985	1990
UNITED STATES	44.6	53.3	67.0	72.0	86.3	102.9	121.9
WESTERN EUROPE	26.4	34.4	46.0	49.1	62.6	75.2	87.2
JAPAN	3.7	6.2	12.0	13.4	20.4	26.7	34.0
SINO-SOVIET BLOC	39.0	45.2	58.3	63.7	82.0	94.0	109.0
REST OF WORLD	18.0	24.3	33.6	35.7	45.0	52.1	60.4
TOTAL	131.7	163.4	216.9	233.9	296.3	350.9	416.5

[1] 1 Quadrillion Btu = 500,000 barrels petroleum per day for a year
= 40 million tons of bituminous coal
= 1 trillion cubic feet of natural gas
= 100 billion kWh (based on a 10,000-Btu/kWh heat rate)

(Source 17)

World Energy Consumption by Source, 1960-90



(Source 17)

World energy consumption increased at an annual rate of 4.9 percent from 1960 to 1972, and is projected to increase at a 3.3-percent annual rate from 1972 to 1990.

Coal is projected to increase at a 1.8-percent annual rate, petroleum at 2.4 percent, natural gas at 2.9 percent, hydropower and geothermal at 2.1 percent, and nuclear power at a 23.6-percent annual rate during the 1972-90 period.

In 1990, coal is projected to constitute approximately 22 percent of total world energy consumption, petroleum 40 percent, natural gas 19 percent, hydropower and geothermal 5 percent, and nuclear power 15 percent.

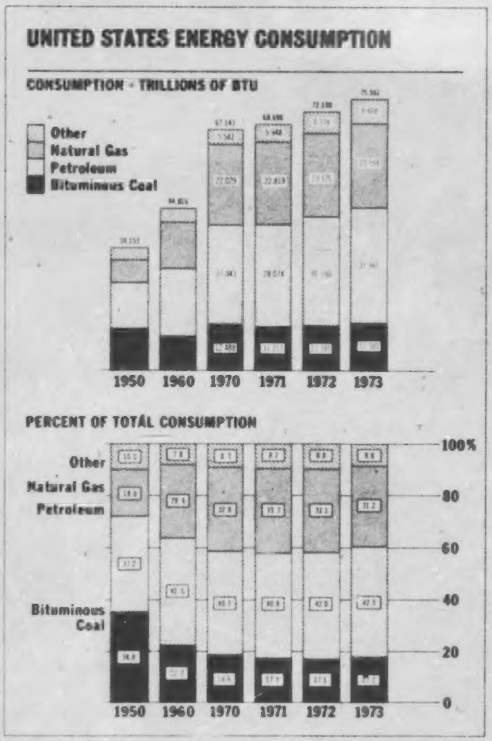
World Energy Consumption by Source, 1960-90

(Quadrillion Btu)[1]

ENERGY SOURCE	1960	1965	1970	1972	1980	1985	1990
COAL	61.5	62.6	66.8	66.3	79.2	85.7	92.0
PETROLEUM	45.3	64.4	96.9	107.5	132.3	147.2	165.0
NATURAL GAS	18.0	26.6	40.6	45.8	56.8	67.3	77.1
HYDROPOWER & GEOTHERMAL	6.9	9.6	11.8	12.9	15.4	17.1	18.8
NUCLEAR		.2	.8	1.4	12.6	33.6	63.6
TOTAL	131.7	163.4	216.9	233.9	296.3	350.9	416.6

[1] 1 Quadrillion Btu = 500,000 barrels petroleum per day for a year
= 40 million tons of bituminous coal
= 1 trillion cubic feet of natural gas
= 100 billion kWh (based on a 10,000-Btu/kWh heat rate)

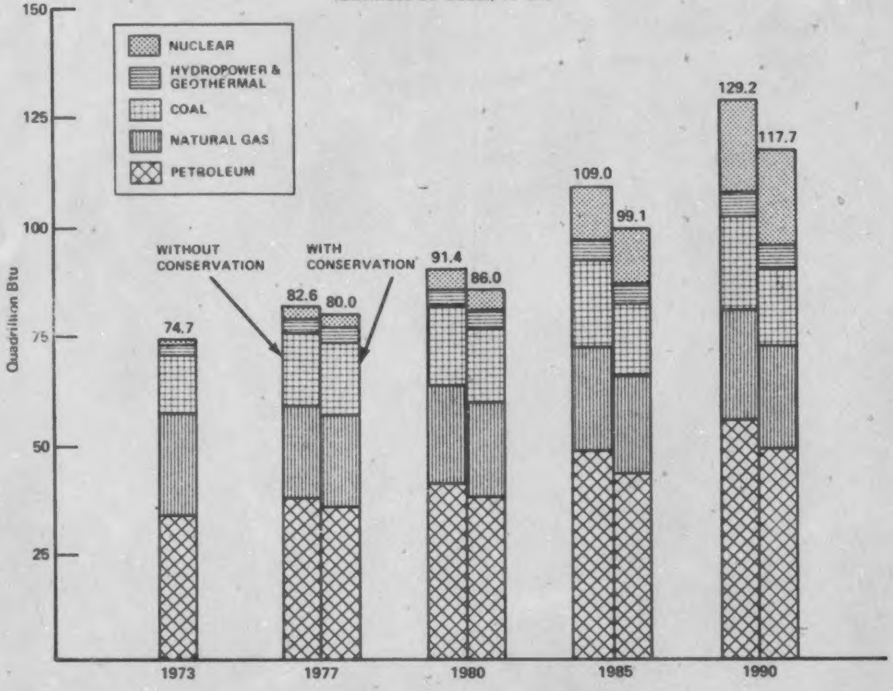
(Source 9)


UNITED STATES ENERGY CONSUMPTION
CONSUMPTION - TRILLIONS OF BTU
Other
Natural Gas
Petroleum
Bituminous Coal
1950
1960
1970
1971
1972
1973
PERCENT OF TOTAL CONSUMPTION
Other
Natural Gas
Petroleum
Bituminous Coal
100%
80
60
40
20
0
1950
1960
1970
1971
1972
1973

(Source 17)

U.S. Gross Energy Consumption, 1973-90

(Business as Usual, $7 Oil)



(Source 17)

During the 1973-90 period, cumulative gross energy consumption in the United States will be 5 percent lower if $11 oil rather than $7 oil prevails for both business as usual without conservation and accelerated supply without conservation.

Cumulative U.S. Gross Energy Consumption Projections
(Quadrillion Btu)[1]

SOURCE	BUSINESS AS USUAL				ACCELERATED SUPPLY			
	WITH CONSERVATION		WITHOUT CONSERVATION		WITH CONSERVATION		WITHOUT CONSERVATION	
	$7 OIL	$11 OIL	$7 OIL	$11 OIL	$7 OIL	$11 OIL	$7 OIL	$11 OIL
PETROLEUM	683	571	746	622	675	592	744	623
GAS	380	392	396	407	401	410	413	422
COAL	280	315	314	345	261	279	285	309
HYDROPOWER & GEOTHERMAL	72	72	72	72	72	72	72	72
NUCLEAR	146	146	146	146	174	174	174	174
TOTAL	1,561	1,496	1,674	1,592	1,583	1,527	1,688	1,600

[1] 1 Quadrillion Btu = 500,000 barrels petroleum per day for a year
= 40 million tons of bituminous coal
= 1 trillion cubic feet of natural gas
= 100 billion kWh (based on a 10,000-Btu/kWh heat rate)

(Source 5)

Composition of U.S. Energy Use, 1970-2000

(Energy flows in trillion Btu)

	Consuming Sector					
	Household, Commercial	Industrial	Transportation	Electricity Generation	Synthetic Gas	Total Input
1970						
Coal	427	5004	8	7483	0	12922
Petroleum	6453	5267	15592	2087	0	29614
Natural Gas	7108	10162	745	4015	0	22029
Hydro, Nuclear	0	0	0	2879	0	2879
Total Input	13988	20433	16345	16464	0	67444
Electricity	3000	2210	16	0	0	5218
Synthetic Gas	0	0	0	0	0	0
Total	16988	22643	16361	16464	0	67444
1975						
Coal	200	4393	0	8625	0	13219
Petroleum	6819	6627	17937	2400	0	33783
Natural Gas	8415	11102	945	4290	0	24753
Hydro, Nuclear	0	0	0	5475	0	5475
Total Input	15435	22122	18882	20790	0	77230
Electricity	3982	2709	22	0	0	6713
Synthetic Gas	0	0	0	0	0	0
Total	19418	24831	18904	20790	0	77230
1980						
Coal	180	3897	0	10227	0	14304
Petroleum	7996	7665	20967	2567	0	39195
Natural Gas	8515	12778	1003	4505	0	26800
Hydro, Nuclear	0	0	0	10115	0	10115
Total Input	16691	24340	21970	27413	0	90414
Electricity	5427	3396	30	0	0	8853
Synthetic Gas	0	0	0	0	0	0
Total	22118	27736	22000	27413	0	90414

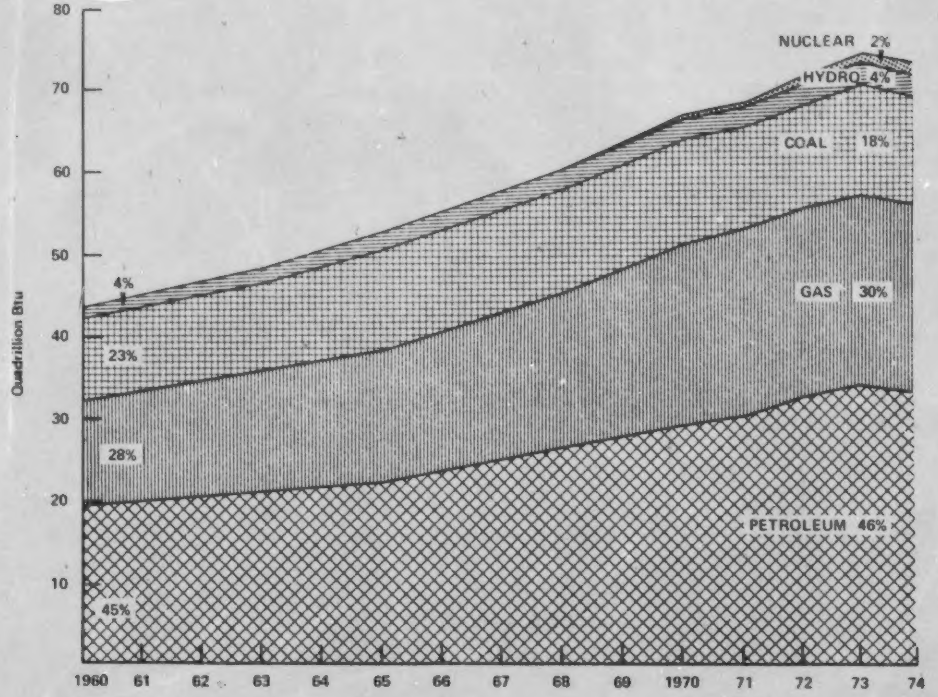
Continued on page ____

(Source 5)

	Household, Commercial	Industrial	Transportation	Electricity Generation	Synthetic Gas	Total Input
1985						
Coal	174	3677	0	11779	1111	16741
Petroleum	9149	8938	23948	2907	89	45031
Natural Gas	7499	14690	993	4840	0	28022
Hydro, Nuclear	0	0	0	16010	0	16010
Total Input	16822	27304	24942	35536	1199	105804
Electricity	7490	3951	37	0	0	11478
Synthetic Gas	310	379	0	0	0	690
Total	24623	31635	24978	35536	1199	105804
1990						
Coal	135	3612	0	13545	2594	19887
Petroleum	9964	10655	25902	4053	208	50783
Natural Gas	6462	15978	1000	5173	0	28612
Hydro, Nuclear	0	0	0	23616	0	23616
Total Input	16561	30245	26902	46387	2802	122897
Electricity	10064	4876	43	0	0	14984
Synthetic Gas	808	988	0	0	0	1798
Total	27434	36109	26945	46387	2802	122897
2000						
Coal	174	5048	0	15878	5061	26160
Petroleum	12727	14405	29810	4085	405	61432
Natural Gas	4742	16632	954	6310	0	28639
Hydro, Nuclear	0	0	0	47152	0	47152
Total Input	17643	36085	30764	73425	5466	163383
Electricity	16737	6927	56	0	0	23720
Synthetic Gas	1638	2002	0	0	0	3640
Total	36017	45014	30820	73425	5466	163383

(Source 17)

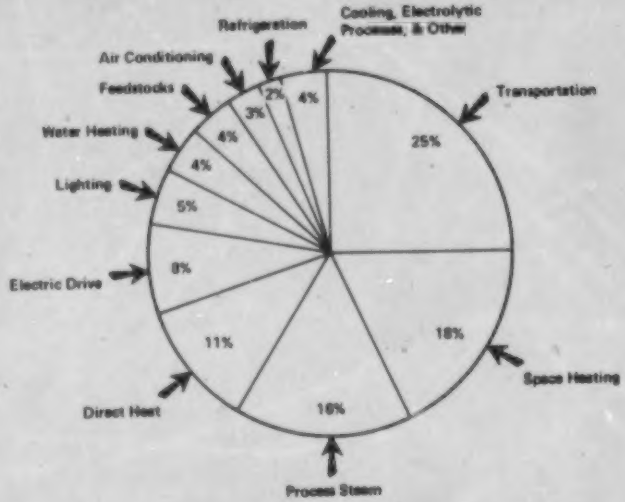
U.S. Gross Energy Consumption Patterns By Source, 1960-74



(Source 17)

U.S. Gross Energy End Uses, 1973

TOTAL GROSS ENERGY USE: 74.7 Quadrillion Btu



(Source 5)

U.S. Energy Consumption, 1970-2000

1. U.S Energy Consumption (Quadrillion Btu)	1970	1975	1980	1985	1990	2000
Coal	12.022	13.219	14.304	16.741	19.887	26.160
Petroleum	29.614	33.783	39.195	45.031	50.783	61.432
Electricity	5.218	6.713	8.853	11.478	14.984	23.720
Gas	22.029[1]	24.753	26.800	28.712	30.408	32.279

2. Energy Consumption, Growth Rates (Average percent per annum)	1970	1975	1980	1985	1990	2000
Coal		0.46	1.59	3.20	3.50	2.78
Petroleum		2.67	3.02	2.81	2.43	1.92
Electricity		5.17	5.69	5.33	5.48	4.70
Gas		2.36	1.60	1.39	1.15	0.60

3. Energy Consumption, Physical Units	1970	1975	1980	1985	1990	2000
Coal (Million short tons)	525	572	618	724	860	1131
Petroleum (Million barrels a day)	14.70	16.77	19.45	22.35	25.20	30.49
Electricity (Billion kilowatt hours)	1530	1958	2582	3347	4370	6917
Gas (Trillion cubic feet)	21.37	23.99	25.90	27.71	29.33	31.10

Note: Coal consumption includes coal used in electricity generation and in the production of synthetic gas. Petroleum consumption includes petroleum inputs into electricity generation and synthetic gas. Gas consumption includes both natural and synthetic gas.

(Source 5)

U.S. Energy Input, 1970-2000

	1970	1975	1980	1985	1990	2000
1. U.S. Total Energy Input (Quadrillion Btu)						
Coal	12.922	13.219	14.304	16.741	19.887	26.160
Petroleum	29.614	33.783	39.195	45.031	50.783	61.432
Natural gas (exc. synthetic gas)	22.029	24.753	26.800	28.022	28.612	28.639
Hydro, nuclear, other	2.879	5.475	10.115	16.010	23.616	47.152
Total	67.444	77.230	90.414	105.804	122.897	163.383
2. Total Energy Input, Growth Rates (Average percent per annum)						
Coal		0.46	1.59	3.20	3.50	2.78
Petroleum		2.67	3.02	2.81	2.43	1.92
Natural gas		2.36	1.60	0.90	0.42	0.01
Hydro, nuclear, other		13.72	13.06	9.62	8.08	7.16
Total		2.75	3.20	3.19	3.04	2.89
3. Total Energy Input, Composition (Percent of total)						
Coal	19.16	17.12	15.82	15.82	16.18	16.01
Petroleum	43.91	43.74	43.35	42.56	41.32	37.60
Natural gas	32.66	32.05	29.64	26.48	23.28	17.53
Hydro, nuclear, other	4.27	7.09	11.19	15.13	19.22	28.86
Total	100.00	100.00	100.00	100.00	100.00	100.00

(Source 9)

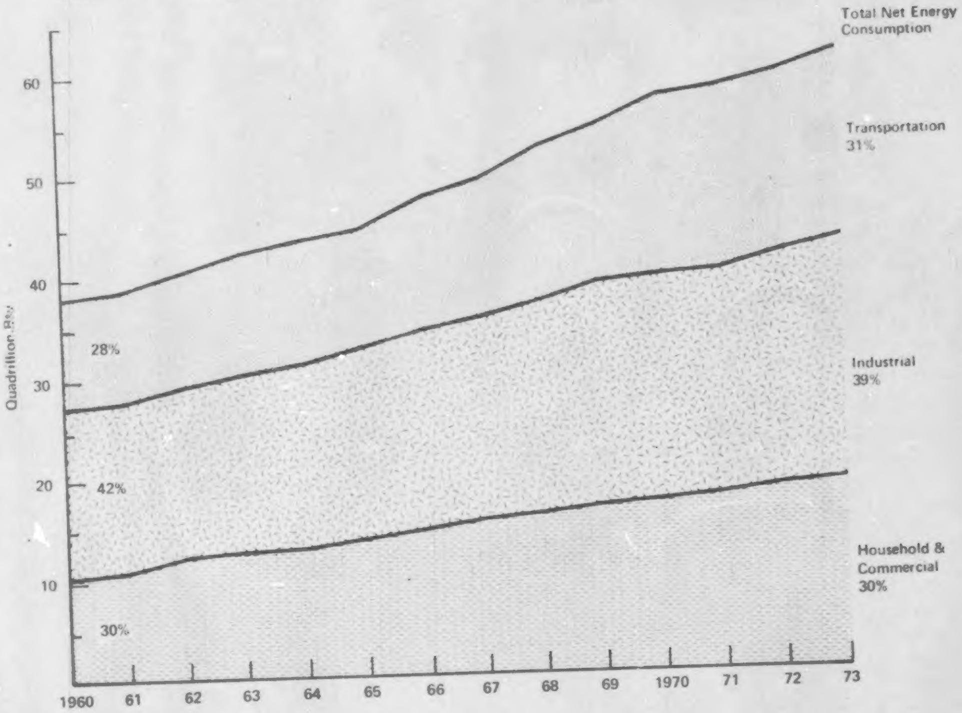
ENERGY CONSUMPTION PER CAPITA IN THE UNITED STATES, 1950-1973[a]

Year	Total Energy Consumed (Trillions of Btu)	Natural Gas Consumed (Trillions of Btu)	Resident Population (Thousands)	Index of Industrial Production (1967 = 100)	Total Energy Per Capita (Millions of Btu)	Natural Gas Per Capita (Millions of Btu)
1950	34,153	6,150	151,241	47.4	226	41
1951	36,913	7,248	153,307	51.4	241	47
1952	36,576	7,760	155,680	53.3	235	50
1953	37,697	8,156	158,235	57.7	238	52
1954	36,360	8,534	161,161	54.3	226	53
1955	39,956	9,232	[illegible]	61.1	243	56
1956	42,007	9,834	167,310	63.2	251	59
1957	41,920	10,416	170,375	63.7	246	61
1958	41,493	10,995	173,332	59.3	239	63
1959	43,507	11,991	177,135	66.8	246	68
1960	44,816	12,736	179,992	68.8	249	71
1961	45,573	13,228	183,057	69.4	249	72
1962	47,620	14,027	185,890	74.8	256	75
1963	49,649	14,843	188,658	78.6	263	79
1964	51,539	15,515	191,372	83.7	269	81
1965	53,969	16,097	193,815	90.7	278	83
1966	56,412	17,393	195,936	98.9	288	89
1967	58,265	18,250	197,859	100.0	294	92
1968	61,763	19,580	199,846	104.6	309	98
1969	64,979	21,020	201,423	110.7	323	104
1970	67,143	22,029	203,185	106.6	330	108
1971	68,698	22,819	207,203	106.8	332	110
1972	72,108	23,125	208,969	115.2	345	111
1973p	75,561	23,558	209,844	125.6	360	112

a. Alaska and Hawaii included subsequent to 1958.
p—Preliminary.
Sources: U.S. Bureau of Mines, U.S. Bureau of the Census and the Federal Reserve Board.

(Source 17)

U.S. Net Energy Consumption, by Final Consuming Sector, 1960-73



(Source 9)

ANNUAL CONSUMPTION OF ENERGY RESOURCES BY MAJOR SOURCES IN THE UNITED STATES, BY CONSUMING SECTORS, 1968-1973[a]

(Trillions of Btu)

Consuming sectors	Anthracite	Bituminous and Lignite	Natural gas, dry[b]	Petroleum[c]	Hydropower[d]	Nuclear power[d]	Total gross energy inputs[e]	Utility electricity purchased[f]	Total sector energy inputs
Household and commercial:									
1968	121	400	6,451	6,128	–	–	13,108	2,467	15,575
1969	107	340	6,890	6,368	–	–	13,605	2,752	16,357
1970	103	324	7,108	6,453	–	–	13,988	3,000	16,988
1971	98	300	7,366	6,440	–	–	14,213	3,209	17,421
1972	75	312	7,642	6,667	–	–	14,696	3,478	18,174
1973p	75	295	8,001	7,024	–	–	15,395	3,727	19,122
Industrial:									
1968	88	5,044	9,274	4,820	35	–	19,253	2,044	21,297
1969	70	4,981	9,885	5,047	34	–	20,017	2,155	22,172
1970	59	4,943	10,161	5,061	34	–	20,258	2,210	22,468
1971	47	4,356	10,570	5,094	34	–	20,001	2,293	22,294
1972	35	4,332	10,591	5,668	35	–	20,561	2,493	23,054
1973p	29	4,425	10,825	6,043	35	–	21,357	2,671	24,028
Transportation:[g]									
1968	NA	11	610	14,681	–	–	15,302	18	15,320
1969	NA	8	651	15,249	–	–	15,908	17	15,925
1970	NA	8	745	15,720	–	–	16,473	16	16,489
1971	NA	6	766	16,286	–	–	17,058	17	17,075
1972	NA	4	790	17,264	–	–	18,058	17	18,075
1973p	NA	5	814	17,927	–	–	18,746	18	18,764
Electricity generation, utilities:[d]									
1968	56	6,938	3,245	1,181	2,307	130	13,857	4,529	–
1969	47	7,180	3,596	1,628	2,625	146	15,220	4,924	–
1970	48	7,213	4,015	2,087	2,616	229	16,208	5,226	–
1971	42	7,288	4,117	2,543	2,828	404	17,222	5,519	–
1972	40	7,797	4,102	3,134	2,911	576	18,560	5,988	–
1973p	36	8,655	3,918	3,435	2,906	853	19,803	6,416	–
Miscellaneous and unaccounted for:									
1968	1	–	–	242	–	–	243	–	243
1969	–	–	–	229	–	–	229	–	229
1970	–	–	–	216	–	–	216	–	216
1971	–	–	–	207	–	–	207	–	207
1972	–	–	–	233	–	–	233	–	233
1973p	–	–	–	260	–	–	260	–	260
Total gross energy inputs:									
1968	258	12,401	19,580	27,052	2,342	130	61,763	–	52,435
1969	224	12,509	21,020	28,421	2,659	146	64,979	–	54,683
1970	210	12,488	22,029	29,537	2,650	229	67,143	–	56,161
1971	186	11,857	22,819	30,570	2,862	404	68,698	–	56,995
1972	150	12,345	23,125	32,966	2,946	576	72,108	–	59,536
1973p	140	13,380	23,558	34,689	2,941	853	75,561	–	62,174

[a] Gross energy is the total of inputs into the economy of the primary fuels (including imports) or their derivatives, plus the generation of hydro and nuclear power (converted to equivalent energy inputs).

[b] Excludes natural gas liquids.

[c] Petroleum products including still gas, liquefied refinery gas and natural gas liquids.

[d] Outputs of hydropower (adjusted for net imports or net exports) are converted to theoretical energy inputs calculated from national average heat rates for fossil-fueled steam-electric plants provided by the Federal Power Commission using 10,379 Btu per net KWH for 1973. Energy input for nuclear power converted at an average heat rate of 10,660 Btu per net KWH based on information from the Atomic Energy Commission. Excludes inputs for power generated by non-utility plants, which are included within the other consuming sectors.

[e] Gross energy resource inputs with electricity generation shown as separate consuming sector.

[f] Utility electricity generated and imported, distributed to the other consuming sectors as energy resource inputs. Distribution to sectors is based on historical series in Edison Institute Statistical Yearbook. Conversion of electricity to energy equivalent by sector was made at the value of contained energy corresponding to 100 percent thermal efficiency using a theoretical rate of 3,412 Btu/KWH.

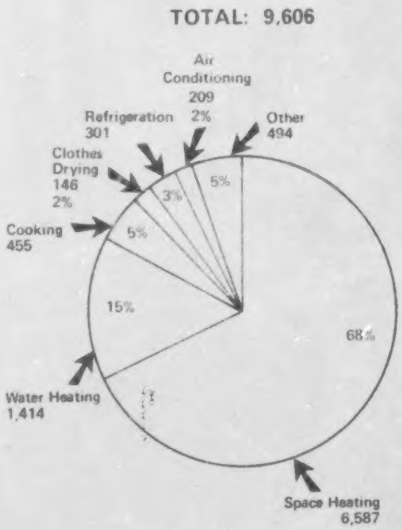
[g] Includes bunkers and military transportation.

p—Preliminary.

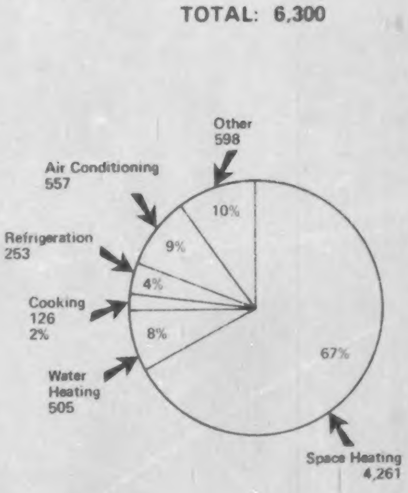
Source: U.S. Bureau of Mines. *Department of the Interior News Release*, March 13, 1974.

U.S. Net Energy Consumption, Residential and Commercial Sectors, 1970

(Trillion Btu)[1]
(Source 17)



Residential End Use



Commercial End Use

Note.—Does not include nonenergy uses.

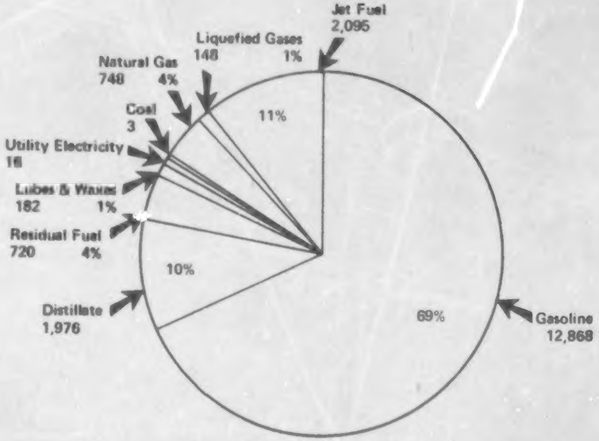
[1] 1 Quadrillion Btu = 1,000 trillion Btu.

(Source 17)

U.S. Net Energy Consumption, Transportation Sector, 1973

(Trillion Btu)

TOTAL: 18,756



1973

(Source 5)

Energy Inputs into U.S. Electricity Generation, 1970-2000

	1970	1975	1980	1985	1990	2000
1. Energy Inputs (Quadrillion Btu)						
Coal	7.483	8.625	10.227	11.779	13.545	15.878
Petroleum	2.087	2.400	2.567	2.907	4.053	4.085
Gas	4.015	4.290	4.505	4.840	5.173	6.310
Hydro, Nuclear, Other	2.879	5.475	10.115	16.010	23.616	47.152
Total	16.464	20.790	27.413	35.536	46.387	73.425
2. Energy Inputs, Percent of Total						
Coal	45.4	41.5	37.3	33.2	29.2	21.6
Petroleum	12.7	11.5	9.4	8.2	8.7	5.6
Gas	24.4	20.6	16.4	13.6	11.2	8.6
Hydro, Nuclear, Other	17.5	26.3	36.9	45.1	50.9	64.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

(Source 9)

ANNUAL CONSUMPTION OF MINERAL ENERGY RESOURCES AND ELECTRICITY FROM HYDROPOWER AND NUCLEAR POWER IN THE UNITED STATES, 1950-1973[a]

(Trillions of Btu)[b]

Year	Natural Gas Dry[c]	Natural Gas Liquids	Crude Petroleum and Products	Bituminous Coal and Lignite	Anthracite Coal	Water Power[d]	Nuclear[d]	Grand Total Energy
1950	6,150	783	12,706	11,900	1,013	1,601	–	34,153
1955	9,232	1,196	16,328	11,104	599	1,497	–	39,956
1956	9,834	1,209	17,418	11,338	610	1,598	–	42,007
1957	10,416	1,282	17,328	10,838	528	1,568	–	41,920
1958	10,995	1,240	17,428	9,607	483	1,740	–	41,493
1959	11,991	1,348	18,399	9,596	478	1,695	–	43,507
1960	12,736	1,427	18,608	9,967	447	1,626	5	44,816
1961	13,228	1,498	18,989	9,809	404	1,628	17	45,573
1962	14,027	1,586	19,681	10,160	363	1,780	23	47,620
1963	14,843	1,703	20,247	10,722	361	1,740	33	49,649
1964	15,515	1,772	20,700	11,295	365	1,873	34	51,554
1965	16,097	1,853	21,566	12,030	328	2,057	38	53,969
1966	[illegible]	[illegible]	22,405	12,205	290	2,073	57	56,412
1967	18,250	2,043	23,292	11,982	274	2,344	80	58,265
1968	19,580	2,[illegible]39	24,813	12,401	258	2,342	130	61,763
1969	21,020	2,459	25,962	12,509	224	2,659	146	64,979
1970	22,029	2,494	27,043	12,488	210	2,650	229	67,143
1971	22,819	2,496	28,074	11,857	186	2,862	404	68,698
1972	23,125	2,706	30,260	12,345	150	2,946	576	72,108
1973p	23,558	2,724	31,965	13,380	140	2,941	853	75,561

a. Represents production minus exports plus imports, and adjusted for change in inventories.
b. The Btu value per cubic foot for natural gas dry for 1964 and prior years is 1,035; for 1965-1968 1,032; for 1969, 1971 and 1972 1,031; for 1973 1,021. See Table 13 for Btu values assigned to other energy sources.
c. Marketed production minus shrinkage caused by liquids extraction (34 cubic feet per gallon produced).
d. See Table 13 for procedures used to determine Btu equivalents.
p–Preliminary.
Source: U.S. Bureau of Mines. *Natural Gas Annual*, 1973.

ANNUAL CONSUMPTION OF MINERAL ENERGY RESOURCES AND ELECTRICITY FROM HYDROPOWER AND NUCLEAR POWER IN THE UNITED STATES, 1950-1973

(Percentage)

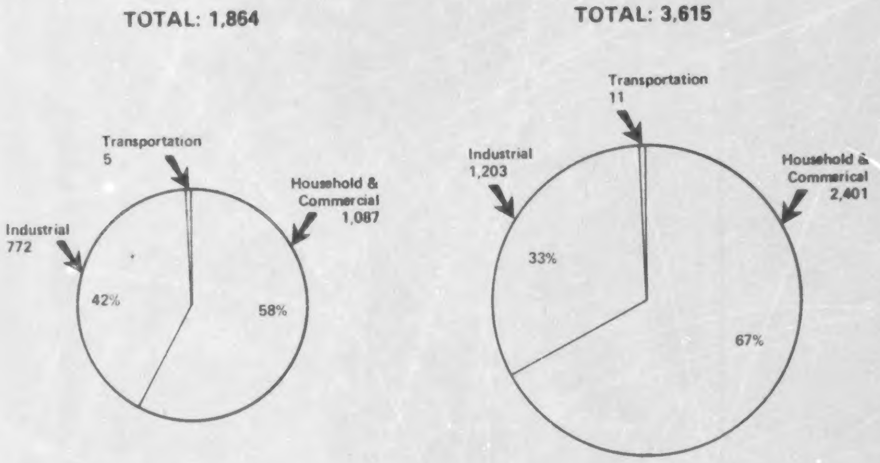
Year	Natural Gas Dry	Natural Gas Liquids	Crude Petroleum and Products	Bituminous Coal and Lignite	Anthracite Coal	Water Power	Nuclear	Grand Total Energy
1950	18.0	2.3	37.2	34.8	3.0	4.7	–	100.0
1955	23.1	3.0	40.8	27.8	1.5	3.8	–	100.0
1956	23.4	2.9	41.5	27.0	1.4	3.8	–	100.0
1957	24.8	3.0	41.4	25.8	1.3	3.7	–	100.0
1958	26.5	3.0	42.0	23.1	1.2	4.2	–	100.0
1959	27.6	3.1	42.3	22.0	1.1	3.9	–	100.0
1960	28.4	3.2	41.6	22.2	1.0	3.6	a	100.0
1961	29.0	3.3	41.6	21.5	0.9	3.6	0.1	100.0
1962	29.5	3.3	41.3	21.3	0.8	3.7	0.1	100.0
1963	29.9	3.4	40.8	21.6	0.7	3.5	0.1	100.0
1964	30.5	3.4	39.9	21.8	0.7	3.6	0.1	100.0
1965	29.8	3.4	40.0	22.3	0.6	3.8	0.1	100.0
1966	30.9	3.5	39.7	21.6	0.5	3.7	0.1	100.0
1967	31.3	3.5	40.0	20.6	0.5	4.0	0.1	100.0
1968	31.7	3.6	40.2	20.1	0.4	3.8	0.2	100.0
1969	32.4	3.8	39.9	19.3	0.3	4.1	0.2	100.0
1970	32.8	3.7	40.3	18.6	0.3	4.0	0.3	100.0
1971	33.2	3.6	40.8	17.3	0.3	4.2	0.6	100.0
1972	32.1	3.7	42.0	17.1	0.2	4.1	0.8	100.0
1973p	31.2	3.6	42.3	17.7	0.2	3.9	1.1	100.0

a. Less than 0.05.
p–Preliminary.
Source: U.S. Bureau of Mines. *Natural Gas Annual*, 1973.

U.S. Net Electricity Consumption by Sector, 1973 and 1985[1]

(In Billions of Kilowatt Hours)

(Source 17)



TOTAL: 1,864

TOTAL: 3,615

1973

1985
Business As Usual, $11 Oil

---

[1] Net generation plus net imports (includes transmission losses).

(Source [illegible])

Impact of Btu Taxes on Energy Consumption and Prices, 1980

Tax Rate ($/million Btu)	0	0.1	0.3	0.5
Fuel Consumption (Quadrillion Btu)				
Coal	14.304	14.249	14.117	13.987
Petroleum	39.195	38.628	37.431	36.343
Electricity	8.853	8.827	8.758	8.690
Gas	26.800	26.105	24.818	23.710
Change in Consumption from Base (percent)				
Coal		- 0.38	- 1.31	- 2.22
Petroleum		- 1.45	- 4.50	- 7.28
Electricity		- 0.29	- 1.07	- 1.84
Gas		- 2.59	- 7.40	-11.53
Average Fuel Prices				
Coal ($/ton)	16.89	17.85	19.76	21.67
Refined Petroleum ($/barrel, wholesale)	12.80	13.38	14.55	15.73
Electricity ($/Kwhr)	0.0263	0.0266	0.0273	0.0279
Gas ($/ th cu ft)	1.54	1.61	1.77	1.91
Change in Prices from Base				
Coal		5.68	16.94	28.33
Refined Petroleum		4.57	13.71	22.85
Electricity		1.32	3.96	6.30
Gas		4.87	14.62	24.36
Price of Energy to Taxed Users ($/million Btu)				
Coal	0.73	0.83	1.03	1.23
Petroleum	2.39	2.49	2.69	2.89
Electricity	7.66	7.76	7.96	8.16
Gas	1.48	1.58	1.78	1.98

(Source 5)

Alternative Forecasts of U.S. Electricity Consumption
(Trillion kilowatt hours)

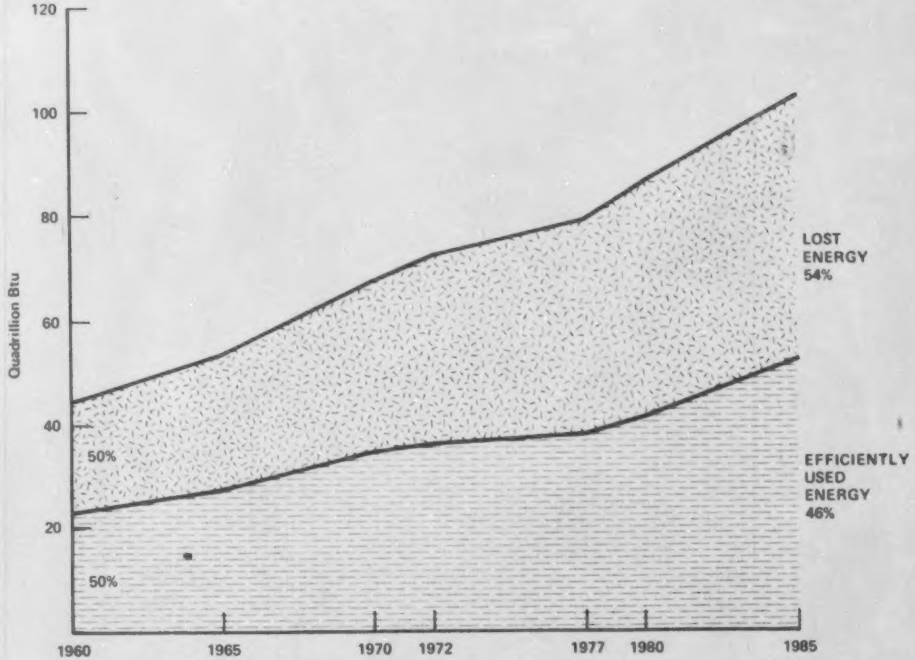
Projection	1970	1975	1980	1985	1990	2000
Chapman, Mount, Tyrrell						
High	1.53	2.14	3.05	--	5.66	9.89
Medium	1.53	1.98	2.38	--	3.01	3.45
Low	1.53	1.88	2.07	--	2.11	2.01
Cornell-National Science Foundation	1.57	2.15 2.15	2.92	3.96	5.38	10.25
Dupree, West	1.53	2.13	3.00	4.14	--	9.01
Federal Power Commission	1.53	--	3.07	--	5.83	--
Hudson, Jorgenson	1.53	1.96	2.58	3.35	4.37	6.92
National Petroleum Council	1.59	2.29	3.29	4.54	--	--

Sources: Cornell-NSF, FPC, NPC forecasts are given in Chapman, Mount and Tyrrell (1972) Table 1, page 3. The Chapman, Mount, Tyrrell "low" forecast assumes that the real electricity price doubles by 2000, the "medium" forecast corresponds to the FPC estimates of a 19% real price increase over 1970-1990, "high" corresponds to a 24% real price decline over 1970-1980 and a 12% decline over each of the 1980-90 and 1990-2000 intervals.

(Source 17)

Efficiency of Energy Utilization, 1960-85

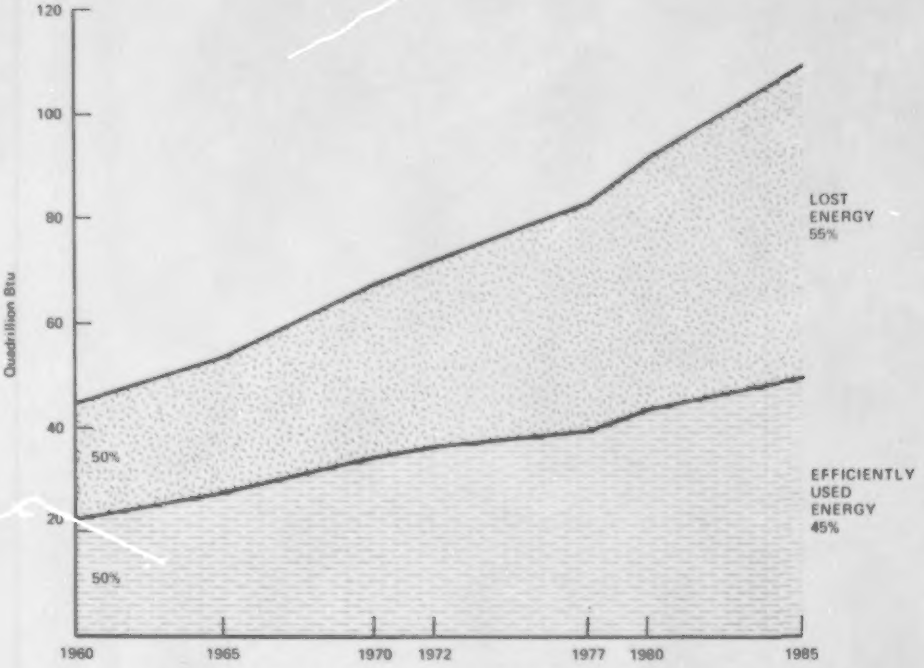
(Business as Usual, $11 Oil)



(Source 17)

Efficiency of Energy Utilization, 1960-85

(Business as Usual, $7 Oil)



ENERGY AND GROSS NATIONAL PRODUCT

(Source 42)

ENERGY CONSUMPTION GROWTH RELATIVE TO G.N.P. GROWTH, SELECTED COUNTRIES, 1960–71

	1960–65 average annual % rate of change in:			1965–71 average annual % rate of change in:		
	(1) energy consumption	(2) real g.n.p.	(3) elasticity (1)/(2)	(1) energy consumption	(2) real g.n.p.	(3) elasticity (1)/(2)
United States	3.9	4.8	0.81	4.5	3.1	1.45
Canada	6.2	5.6	1.11	6.1	4.8	1.27
United Kingdom	2.5	3.3	0.76	1.6	2.5	0.64
France	5.5	5.8	0.95	5.7	5.7	1.00
West Germany	5.8	5.0	1.16	4.2	4.6	0.91
Italy	9.1	5.3	1.72	7.8	5.2	1.50
Sweden	5.8	4.9	1.18	6.1	3.3	1.85
Switzerland	6.8	5.3	1.28	6.0	3.9	1.54
Spain	5.8	8.6	0.67	8.9	6.0	1.48
Belgium–Luxembourg	6.1	4.8	1.27	4.9	4.6	1.06
Netherlands	7.8	5.0	1.56	7.9	5.3	1.49
Denmark	8.6	5.2	1.65	5.2	4.4	1.18
Japan	10.0	10.0	1.00	11.8	11.2	1.05
Australia	6.3	5.0	1.26	4.6	5.1	0.90
India	7.0	3.3	2.42	3.5	4.2	0.83
Venezuela	5.7	7.7	0.74	2.6	4.2	0.56
Mexico	4.6	7.0	0.66	7.9	6.3	1.25

Sources: Data for 1960–5 from Darmstadter, *Energy in the world economy, op. cit.*; energy data 1965–71 from United Nations, *World Energy Supplies*, series J, various numbers; GNP data, 1965, from U.S. Agency for International Development, 'Gross National Product – growth rates and trend Data by Region and Country', Release RC-W-138, 1 May 1973.

Note. The energy consumption growth rates shown here may differ slightly from figures in other tables because of differences in derivation.

(Source 10)

ENERGY CONSUMPTION, GROSS NATIONAL PRODUCT AND POPULATION RELATIONSHIPS

Actual Years 1947-1972

Alternative Projections to 1980, 1990

	AGGREGATE ENERGY CONSUMPTION 1/		GROSS NATIONAL PRODUCT 2/ (GNP in 1958 Dollars)		ENERGY/GNP COEFFICIENT	POPULATION 3/		ENERGY CONSUMED PER CAPITA	
Year	Amount (Trillion Btu)	Average Percent Change	Amount ($ Billions)	Average Percent Change	(Change in Energy Per Unit of GNP Change)	Amount (Millions)	Average Percent Change	Amount (Million Btu)	Average Percent Change
1947	33,[illegible]	–	$ 309.9	–	–	144.1	–	229.[illegible]	–
1948	[illegible]	2.6	323.7	4.5	.58	146.6	1.7	231.1	2.8
1949	31,469	-5.1	324.1	0.1	-1.00	149.2	1.8	211.0	-8.7
1950	33,992	8.0	355.3	9.6	.83	152.3	2.1	223.2	5.8
1951	36,775	8.2	383.4	7.9	1.04	154.9	1.7	237.4	6.5
1952	36,158	[illegible]	395.1	3.1	.29	157.6	1.7	231.3	-2.6
1953	37,966	[illegible]	412.8	4.5	.69	160.2	1.6	234.4	1.4
1954	36,261	[illegible]	407.0	-1.4	2.50	163.0	1.7	222.5	-5.2
1955	39,703	[illegible]	438.0	7.6	1.21	165.9	1.8	239.3	7.6
1956	41,790	[illegible]	446.1	1.8	2.78	168.9	1.8	246.9	3.2
1957	41,784	0	452.5	1.4	.00	172.0	1.8	242.[illegible]	-1.8
1958	41,646	[illegible]	447.3	-1.1	.09	174.9	1.7	238.4	-1.7
1959	43,[illegible]	[illegible]	475.9	6.4	.[illegible]	177.8	1.7	242.8	1.8
1960	44,569	[illegible]	487.7	2.5	1.32	180.7	1.6	246.6	1.6
1961	45,[illegible]	[illegible]	497.2	1.9	.89	183.7	1.7	246.7	Negl.
1962	[illegible]	[illegible]	529.8	6.6	.75	186.5	1.5	[illegible]	[illegible]
1963	49,[illegible]	[illegible]	551.0	4.0	1.00	189.2	1.4	260.6	[illegible]
1964	[illegible]	[illegible]	58[illegible]	5.5	.71	191.9	1.4	267.0	[illegible]
1965	53,[illegible]	[illegible]	617.8	6.3	.65	194.3	1.3	274.[illegible]	[illegible]
1966	56,[illegible]	[illegible]	658.1	6.5	.89	196.6	1.2	286.9	[illegible]
1967	[illegible]	[illegible]	675.2	2.6	1.27	198.7	1.1	[illegible]	[illegible]
1968	61,76[illegible]	[illegible]	706.6	4.7	1.28	200.7	1.0	307.[illegible]	[illegible]
1969	64,979	[illegible]	725.6	[illegible]	1.9[illegible]	202.7	1.0	320.6	[illegible]
1970	67,444	3.8	722.[illegible]	[illegible]	[illegible]	204.9	1.1	329.2	[illegible]
1971	[illegible]	[illegible]	[illegible]	[illegible]	.78	207.0	1.0	[illegible]	[illegible]
1972	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	208.8	1.0	345.3	[illegible]
1947-1972	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					CASE I 4/				
Projection Years									
From 1972									
To 1980									
F	91,47[illegible]	3.1	1,058	3.7	.84	221.8 (F)	0.7	414.3	[illegible]
E	91,[illegible]	3.4	1,081	4.0	.85	226.1 (E)	0.8	419.0	[illegible]
D	95,[illegible]	[illegible]	1,105	4.3	.86	229.1 (D)	1.1	419.6	[illegible]
To 1990									
F	[illegible]	[illegible]	1,519	3.7	.89	239.1 (F)	0.7	544.4	[illegible]
E	[illegible]	[illegible]	1,600	4.0	.90	246.6 (E)	0.9	555.0	[illegible]
D	[illegible]	[illegible]	1,685	4.3	.91	254.7 (D)	1.1	558.3	[illegible]
					CASE II 5/				
From 1972									
To 1980									
F	[illegible]	[illegible]	1,058	3.7	1.0	221.8 (F)	[illegible]	436.5	2.9
E	[illegible]	[illegible]	1,081	[illegible]	1.0	226.1 (E)	[illegible]	440.3	[illegible]
D	[illegible]	[illegible]	1,105	[illegible]	1.0	229.1 (D)	[illegible]	443.[illegible]	[illegible]
To 1990									
F	[illegible]	[illegible]	1,519	3.7	[illegible]	239.1 (F)	[illegible]	[illegible]	[illegible]
E	[illegible]	[illegible]	1,600	[illegible]	[illegible]	246.6 (E)	[illegible]	[illegible]	[illegible]
D	[illegible]	[illegible]	1,685	[illegible]	[illegible]	254.7 (D)	[illegible]	[illegible]	[illegible]
					BASE CASE 6/				
From 1972									
To 1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
To 1990	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NOTES: 1/ The historical series on energy consumption for 1947-1972 is from United States Energy Through the Year 2000, U.S. Department of the Interior, December 1972.

2/ Historical series on Gross National Product, expressed in billions of 1958 dollars, is from The Economic Report of the President, transmitted to the Congress, January 1973.

3/ The historical series of population change is from the Bureau of the Census, U.S. Department of Commerce as published in the Economic Report of the President, transmitted to the Congress, January 1973. The population projections are based on Series [illegible] of the Bureau of the Census Report P-25, No. [illegible], December 1972 Projections of the Population of the United States by Age and Sex [illegible]

4/ Case I is a linear regression of historical energy consumption for 1947-1972 related to historical Gross National Product (GNP) for [illegible] and projected to 1990 under three assumed rates of growth for GNP and population. The projections under the three assumptions include projected total energy consumption, per capita energy consumption, and average Energy/GNP Coefficient (change in energy per unit of GNP change).

5/ Case II is a simulation of the Case I projections for total energy and per capita energy consumption. The simulation assumes an average Energy/GNP Coefficient of 1.0 during the forecast period. This case assumes that energy growth will be directly proportional to [illegible] economic growth during the forecast period.

6/ The Base Case projections for total energy and per capita energy consumption are derived from the most recently available [illegible] [illegible] energy and energy [illegible] [illegible] prepared by Federal Government agencies. The Base Case [illegible] are shown in detail in Table [illegible].

[illegible]: Bureau of [illegible], Federal Power Commission.

(Source 40)

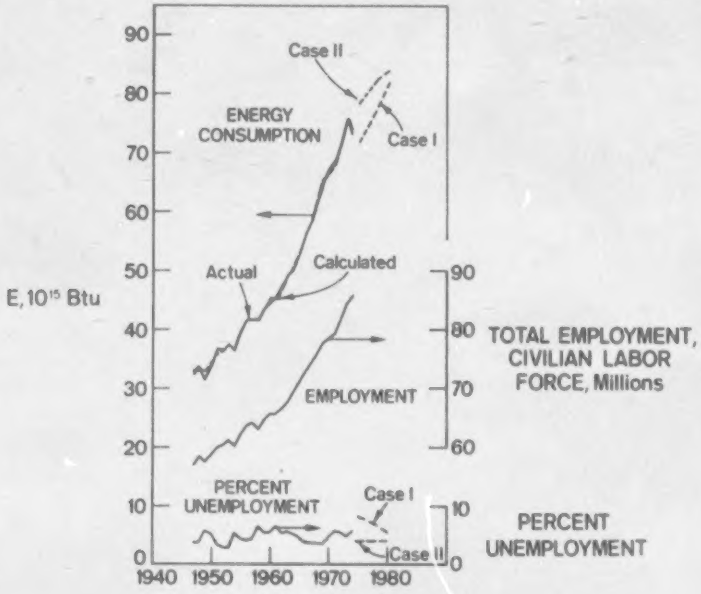
PROJECTED VALUES OF ENERGY CONSUMPTION PER UNIT OF GNP

Year	GNP, Billions of 1958 $	E/G, Million Btu/1958 $	GNP, Billions of 1958 $, 4% Growth Rate	E/G Ratio Million Btu/1958 $
1975	794	0.091	794	0.092
1976	832	0.090	826	0.090
1977	879	0.087	859	0.089
1978	936	0.085	893	0.089
1979	997	0.082	929	0.088
1980	1061	0.080	966	0.087

GNP projection used in the United States Budget, Fiscal Year 1976.

(Source 40)

TREND OF ANNUAL ENERGY CONSUMPTION (E) WITH PROJECTIONS, AND TREND OF UNEMPLOYMENT WITH PROJECTIONS



(Source 43)

RELATIONSHIP BETWEEN GNP AND NATURAL GAS CONSUMPTION

	GNP (Billion 1970 Dollars)	Natural Gas Consumption (Trillion BTU's)*	Natural Gas/ GNP Ratio (BTU's/$)
1950	480.7	6,150	12,800
1951	528.7	7,248	14,000
1952	534.5	7,760	14,500
1953	558.5	8,156	14,600
1954	550.6	8,548	15,500
1955	592.6	9,232	15,600
1956	603.5	9,834	16,300
1957	612.2	10,416	17,000
1958	605.2	10,995	18,200
1959	643.8	11,990	18,600
1960	659.8	12,699	19,200
1961	672.7	13,228	19,700
1962	716.8	14,121	19,700
1963	745.4	14,843	19,900
1964	786.2	15,688	20,000
1965	835.8	16,098	19,300
1966	890.3	17,393	19,500
1967	912.7	18,250	20,000
1968	957.3	19,580	20,500
1969	980.4	21,020	21,400
1970	974.1	22,029	22,600
1975 (est.)	1,196.6†	28,479	23,800
1980 (est.)	1,469.9†	33,516	21,700
1985 (est.)	1,805.6†	39,268	21,700

---

* 1950 to 1970 data from Department of the Interior, Bureau of Mines News Release, "U.S. Energy Use at New High in 1971," March 31, 1972, Supplement Table A and Table B. 1975, 1980 and 1985 data FPC requirements less field use (FPC, *Natural Gas Supply and Requirements of the United States*, Vol. No. 4 (October 1971)). Data are not strictly comparable since Bureau of Mines data includes some field use.

† GNP growth at 4.2 percent in constant 1970 dollars.

ENERGY RESEARCH AND DEVELOPMENT

DIRECT ENERGY R&D OBLIGATIONS (OBS) AND OUTLAYS (BO) FY 1976

(in millions of dollars)

ENERGY PROGRAMS	TOTAL R&D BY 1976		ERDA		NRC		EPA		DOI		NSF		OTHER AGENCIES	
	OBS	BO	OBS	BO	OBS	BO	OBS	BO	OBS	BO	OBS	BO	OBS	BO
Fossil Energy	440	380	384	326	-	-	-	-	48	47	4	4	4	4
Nuclear Energy	1102	991	996	895	104	93	-	-	1	1	-	-	1	1
Conservation	88	83	64	58	-	-	2	2	-	-	5	6	16	16
Environmental Control	83	94	5	4	-	-	73	85	6	5	-	-	-	-
Solar	78	65	70	57	-	-	-	-	-	-	6	8	2	1
Geothermal	27	34	23	29	-	-	-	-	-	-	4	5	-	-
Other	18	16	8	7	-	-	-	-	3	3	8	6	-	-
TOTAL	1834	1663	1551	1376	104	93	75	87	57	56	27	28	27	23

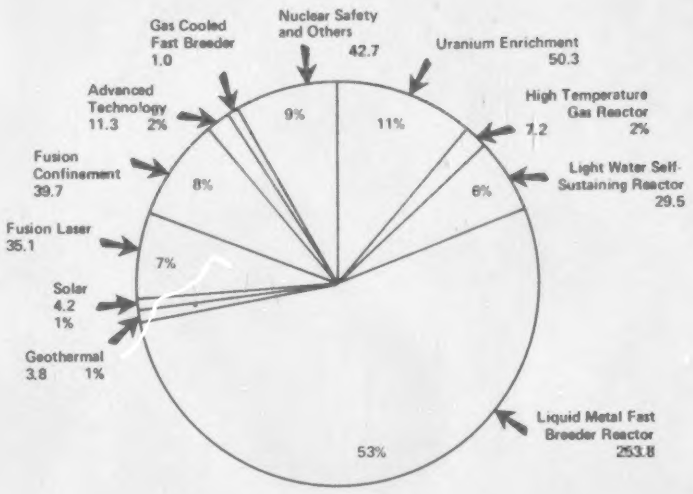
Source: Office of Management and Budget, March 7, 1975

(Source 17)

Federal Funding, Nuclear and Renewable Energy R&D, 1973[1]

($ Million)

TOTAL: 478.6



FY 1973

---

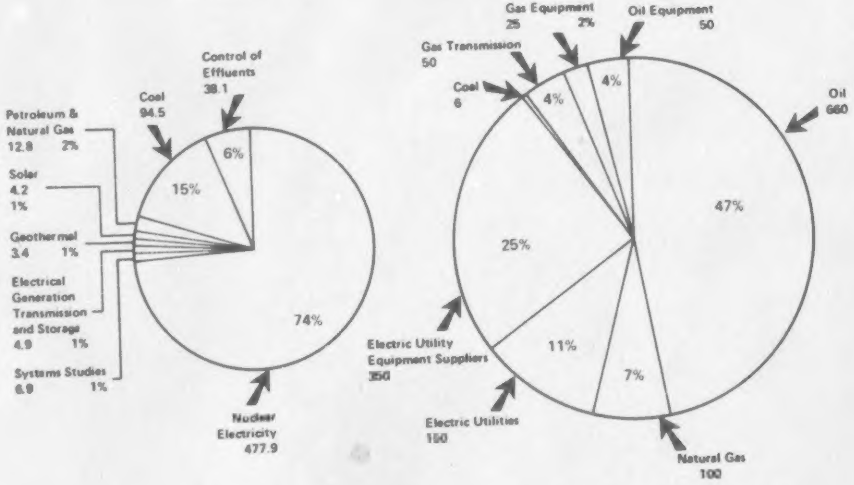
[1] Data are based upon estimated fiscal year 1973 expenditures.

(Source 17)

U.S. Energy R&D Expenditures, Federal and Private Sectors, 1973

($Million)

TOTAL: 642.2 TOTAL: 1,391



Federal Funding
(Fiscal 1973)

Private Sector Funding
(Calendar 1973)

MISCELLANEOUS DATA

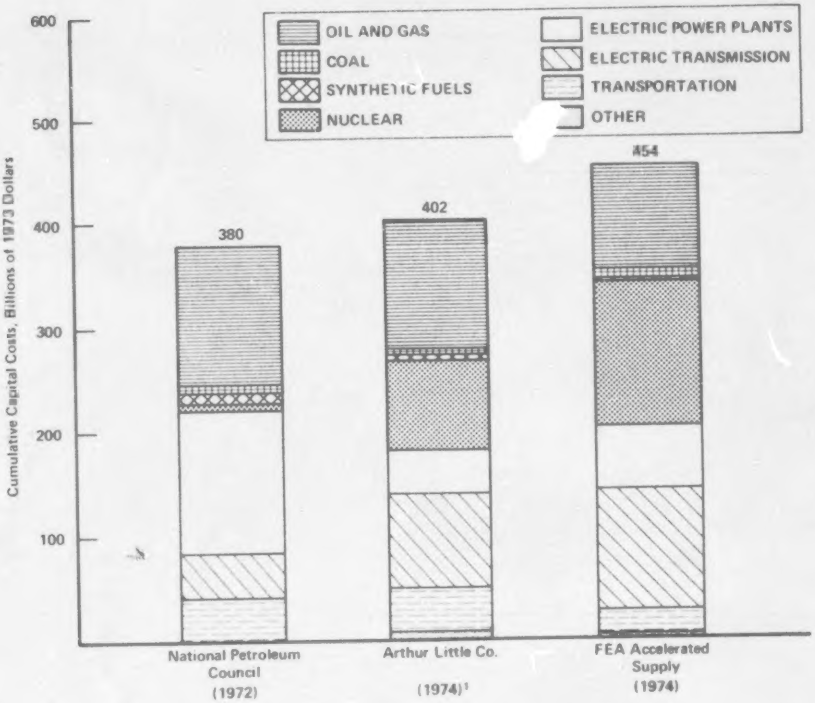
(Source 5)

U.S. Energy Prices, 1970-2000

	1970	1975	1980	1985	1990	2000
1. Fuel Prices, Current Dollars						
Coal ($/short ton)	7.59	11.49	16.89	22.49	28.65	44.54
Crude Petroleum ($/barrel)	3.39	7.00	8.82	10.73	12.86	18.43
Electricity (¢/kilowatt hr.)	1.61	2.10	2.63	3.17	3.77	5.32
Gas ($/thousand cubic ft.)	0.83	0.99	1.54	2.07	2.79	5.34
2. Fuel Prices, Growth Rates (Average percent per annum)						
Coal		8.65	8.01	5.89	4.96	4.51
Crude Petroleum		15.61	4.75	3.98	3.69	3.66
Electricity		5.46	4.60	3.81	3.53	3.50
Gas		3.59	9.24	6.09	6.15	6.71
GNP Price Deflator		5.63	4.75	3.98	3.69	3.66
3. Fuel Prices, Constant Dollars						
Coal ($1975/short ton)	9.98	11.49	13.40	14.67	15.59	16.92
Crude petroleum ($1975/barrel)	4.46	7.00	7.00	7.00	7.00	7.00
Electricity ($1975/kilowatt hr.)	2.12	2.10	2.09	2.07	2.05	2.02
Gas ($1975/thousand cubic ft.)	1.09	0.99	1.22	1.35	1.52	2.03

(Source 17)

Energy Facility Cumulative Capital Requirements, 1975-85

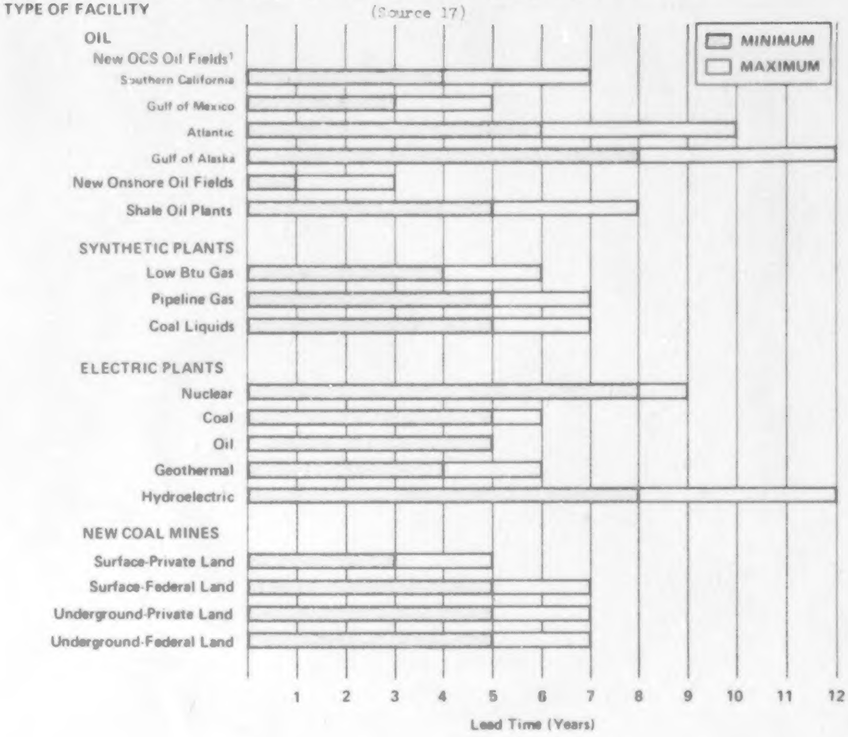


---

[1] Estimate is based upon an energy conservation scenario.

U.S. Energy Facility Production Lead Times

(Source 17)



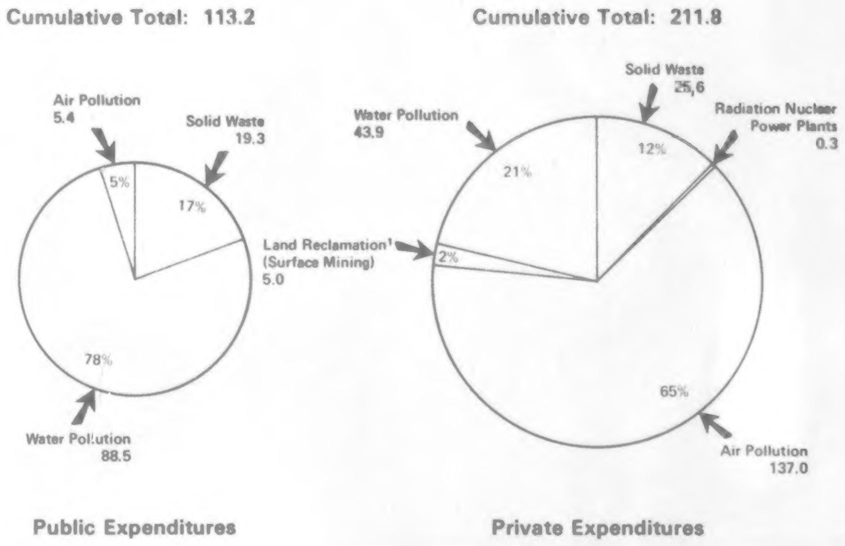
---

[1] Significant production.

(Source 17)

Projected U.S. Pollution Control Expenditures, 1973-82

(Billions of 1973 Dollars)



---

[1] Related to coal mining.

(Source 18)

NATIONAL AIR QUALITY STANDARDS FOR SULFUR OXIDE, PARTICULATES AND NITROGEN OXIDES

	SULFUR OXIDES[1]		PARTICULATES		NITROGEN OXIDES[2]
	DAILY MAXIMUM (MICROGRAMS PER CUBIC METER)	ANNUAL ARITHMETIC MEAN (MICROGRAMS PER CUBIC METER)	DAILY MAXIMUM (MICROGRAMS PER CUBIC METER)	ANNUAL GEOMETRIC MEAN (MICROGRAMS PER CUBIC METER)	ANNUAL ARITHMETIC MEAN (MICROGRAMS PER CUBIC METER)
PRIMARY STANDARD	365	80	260	75	100
SECONDARY STANDARD	260	60	150	60	100

EPA EMISSION STANDARD GUIDELINES FOR NEW AND MODIFIED ELECTRIC UTILITIES

	SULFUR OXIDES[1]		PARTICULATES		NITROGEN OXIDES[2]	
	MAXIMUM 2 HOUR AVERAGE		MAXIMUM 2 HOUR AVERAGE			
	(POUNDS PER MILLION BTU HEAT INPUT)	(GRAMS PER MILLION CALORIES)	(POUNDS PER MILLION BTU HEAT INPUT)	(GRAMS PER MILLION CALORIES)	(POUNDS PER MILLION BTU HEAT INPUT)	(GRAMS PER MILLION CALORIES)
LIQUID FUEL	.8	1.4	.10	.18	.30	.54
SOLID FUEL	1.2	2.2	.10	.18	.70	1.26
GASEOUS FUEL	(3)	(3)	(3)	(3)	.20	.36

SOURCE: Federal Register, Vol. 36, No. 84, April 30, 1971, Part II, p. 8187.
Federal Register, Vol. 36, No. 159, August 17, 1971, Part II, p. 15706.

[1] measured as SO_2

[2] measured as NO_2

[3] Levels in fuel so low, no standards necessary.

Reference 61.

(Source 18)

HEAT RATES AND POWER GENERATING COSTS FOR PROCESSES USING COAL FUEL

	COAL FIRED	COAL FIRED WITH AQCS	COAL FIRED LOW BTU GASIFIER	SOLVENT REFINED COAL FIRED
Net Station heat rate BTU/kw-hr	9,310	9,510*	10,460*	9,030
ANNUAL OPERATING COSTS (Millions of dollars)				
Capital charges at 16%	$ 32.6	$ 45.5	$ 44.1	$ 27.0
Annual operating and maintenance labor	1.5	1.8	1.8	1.3
Annual maintenance material & supplies	4.9	13.2	7.9	2.1
Fuel cost	34.9	35.4	39.1	81.2**
Total annual operating cost	$ 73.9	$ 95.9	$ 92.9	$111.6
Unit cost - mills/kw-hr	9.85	12.8	12.4	14.9

*AQCS (flue gas clean-up)/gasification system included in heat rate.

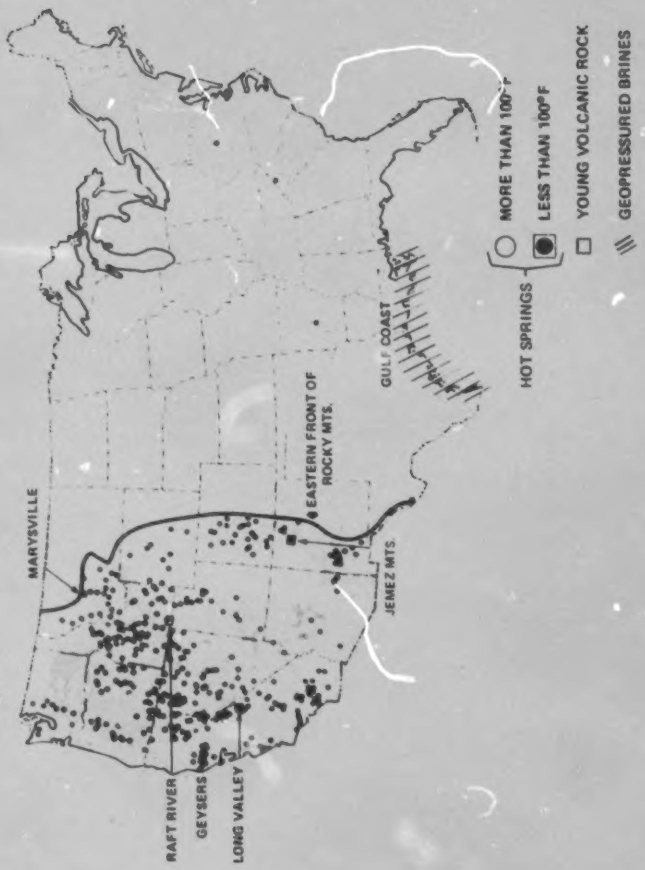
**Solvent refined coal at $1.20 per MMBTU.

Basis for analysis: Steam Cycle - 1000 MW
7500 Hrs/yr operation
Coal cost 50¢ per MMBTU

Source: Reference 67.

U.S. Geothermal Resources, Areas of Promise

(Source 17)

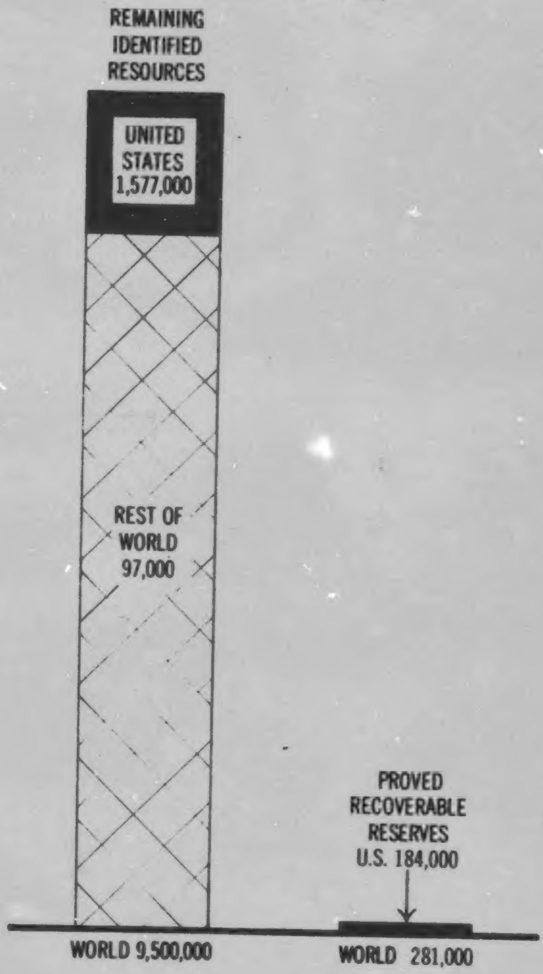

MARYSVILLE
RAFT RIVER
GEYSERS
LONG VALLEY
EASTERN FRONT OF ROCKY MTS.
JEMEZ MTS.
GULF COAST
HOT SPRINGS
○ MORE THAN 100°F
● LESS THAN 100°F
□ YOUNG VOLCANIC ROCK
▨ GEOPRESSURED BRINES

COAL
UNITED STATES AND FOREIGN STATISTICS

(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR COAL

(Million Short Tons)



(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR COAL
(Including Bituminous, Subbituminous, Lignite, Anthracite)

	Million Short Tons	Quadrillion Btu
Remaining Identified Resources 1/		
United States	1,577,000	31,124
Rest of World	7,923,000	158,460
World	9,500,000	189,584
Proved Recoverable Reserves 2/		
United States	184,000	4,054
Rest of World	97,000	1,940
World	281,000	5,994

1/ Remaining identified resources, all categories, that could be made available under certain economic and technological conditions.

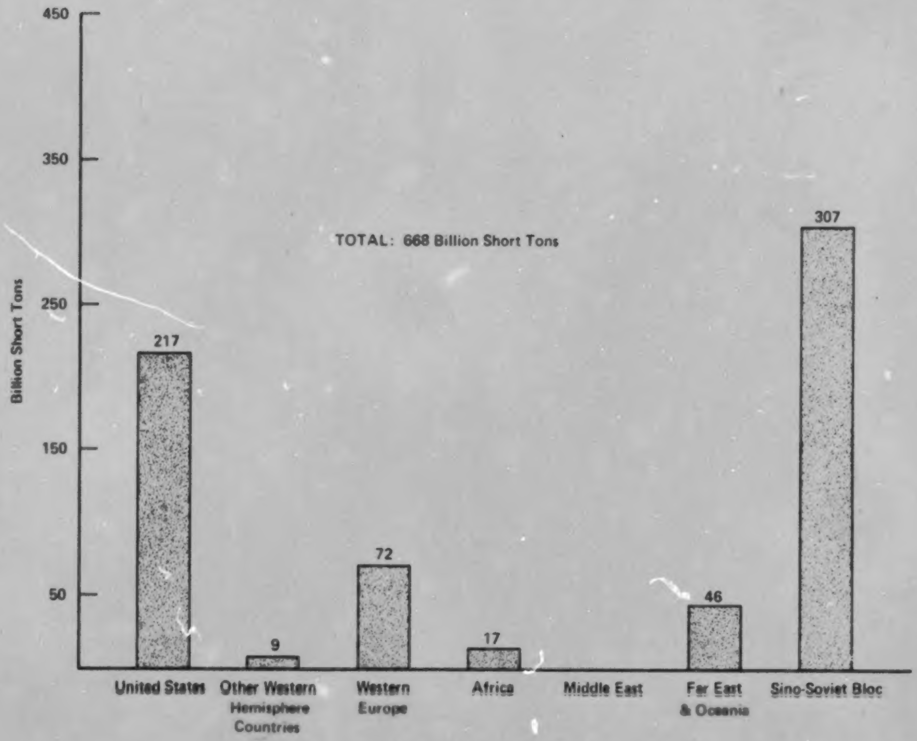
2/ Proved reserves are those recoverable under existing economic and operating conditions at current U.S. prices.

Sources: Energy Resources of the United States, U.S. Geological Survey Circular 650, U.S. Geological Survey, Washington, D.C., 1972; Coal Resources of the United States, U.S. Geological Survey Bulletin 1275, Washington, D.C. Commodity Data Summaries 1974, Bureau of Mines, U.S. Department of the Interior, The World Power Conference of Energy Resources in 1968.

Prepared by: Office of Economics, Federal Power Commission.

(Source 17)

World Recoverable Coal Reserves, 1973



(Source 3)

Bituminous coal and lignite coal: World production by country
(Thousand short tons)

Country 1/	1971	1972	1973 p/
Tanzania: Bituminous	3	3	2
Zaire: Bituminous	126	141	127
Zambia: Bituminous	936	1,033	1,036
Asia:			
Afghanistan: Bituminous 10/	149	e/150	e/150
Burma: Bituminous	22	25	15
China, People's Republic of: Bituminous and lignite e/	r/410,000	r/420,000	450,000
India:			
Bituminous	78,814	82,421	84,878
Lignite	4,084	3,361	3,638
Indonesia: Bituminous	218	197	164
Iran: Bituminous	r/961	1,102	1,157
Japan:			
Bituminous	r/35,472	30,366	24,709
Lignite	r/144	136	93
Korea, North:			
Bituminous e/	6,600	7,200	7,700
Lignite e/	220	220	220
Mongolia:			
Bituminous	111	117	e/120
Lignite	r/2,153	2,367	e/2,400
Pakistan: Bituminous and lignite 11/	r/1,434	1,379	1,456
Philippines: Bituminous	44	43	43
Taiwan: Bituminous	4,930	4,313	3,667
Thailand: Lignite	471	380	398
Turkey:			
Bituminous	5,132	5,116	5,118
Lignite	4,948	5,151	5,296
Oceania:			
Australia:			
Bituminous	r/56,315	60,748	66,914
Lignite	26,775	26,121	27,202
New Zealand:			
Bituminous	2,313	2,237	2,561
Lignite	r/179	168	160
World total:			
Bituminous	r/1,[illegible]	1,[illegible],407	1,934,050
Lignite (including Peat)	r/[illegible]	886,414	903,072
Mixed grades 12/	r/411,434	421,379	451,456
Total, all grades	r/3,13[illegible]	3,230,262	3,288,578

e/ Estimate. p/ Preliminary. r/ Revised.
1/ In addition to the countries listed, Ecuador produced coal, but output was less than 500 tons annually in the years covered by this table.
2/ Excludes production from the State of Texas.
3/ May include a small amount of anthracite.
4/ Includes materials reported in national sources as brown coal.
5/ Available sources report only lignite production; a small amount of bituminous coal may also be produced.
6/ Official sources report the aggregate of anthracite and bituminous; distribution to these separate grades is estimated from reported total.
7/ Output from Norwegian controlled portion only. Output of that portion of Svalbard controlled by the U.S.S.R. is presumably included in the total output recorded for that country.
8/ Run of mine output.
9/ Sales, for year ended August 31 of that stated.
10/ Year beginning March 21 of that stated.
11/ Year ending June 30 of that stated.
12/ Bituminous plus lignite for the People's Republic of China and Pakistan.

(Source 37)

UNITED STATES exports of bituminous coal, by continental groups and countries of destination, 1965-74*

(Short tons)

Country of destination	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974 1/
North and Central America:										
Canada	15,660,773	15,828,528	15,307,986	16,368,203	16,787,801	18,673,375	17,564,631	18,161,306	16,231,179	13,705,791
Costa Rica	163	266	-	299	-	-	143	77	130	22
Dominican Republic	984	-	-	114	-	189	67	99	37	165
El Salvador	92	-	-	-	114	-	-	-	420	60
French West Indies	-	-	643	-	-	-	-	-	-	-
Guatemala	309	133	75	63	89	100	62	-	-	-
Honduras	302	122	354	366	117	305	209	87	125	-
Jamaica	73	-	-	-	-	-	-	137	76	35
Mexico	60,639	52,535	81,648	74,018	115,790	172,668	284,608	466,360	305,399	610,566
Miquelon and St. Pierre	1,832	5,028	6,354	2,728	3,367	2,276	3,674	-	1,446	-
Panama	51	67	462	157	173	-	69	52	-	-
Trinidad and Tobago	1,082	-	237	-	-	-	37	630	-	-
Other	125	326	612	196	450	161	44	-	-	-
	15,727,266	15,886,985	15,778,166	16,828,140	16,907,753	18,869,076	17,851,526	18,628,816	16,538,832	14,116,616
South America:										
Argentina	619,662	662,523	590,368	641,319	476,850	385,590	539,592	393,472	771,705	620,056
Brazil	1,210,317	1,739,313	1,734,501	1,786,823	1,867,866	2,020,461	1,868,696	1,916,626	1,664,696	1,292,296
Chile	126,196	156,182	193,163	306,262	158,725	175,619	208,996	239,729	196,410	312,336
Ecuador	-	-	-	-	20,237	-	-	-	-	-
Peru	1,262	375	-	119	387	3,173	25,718	67,627	22,601	84,760
Uruguay	37,013	56,075	43,308	13,888	9,873	75,578	32,266	32,098	21,083	31,293
Venezuela	1,026	579	623	507	374	257	126	691	306	100
Other	44	-	298	131	-	-	-	306	35	34
	1,995,718	2,613,867	2,562,077	2,569,095	2,869,030	2,920,629	2,672,796	2,650,567	2,656,634	2,350,873
Europe:										
European Economic Community:										
Belgium-Luxembourg 2/	2,216,769	1,960,566	1,422,766	1,052,536	863,117	1,881,626	765,222	1,143,990	1,706,569	1,108,814
Denmark	5,833	1,855	-	-	-	-	-	-	-	-
France	2,069,602	1,573,517	2,130,969	1,459,566	2,753,055	2,361,558	3,105,816	1,575,160	1,865,899	2,510,001
Germany (West) 2/	4,729,895	4,496,131	4,693,782	3,786,602	3,651,695	3,022,481	2,911,468	2,398,991	1,632,676	1,686,007
Ireland (Rep. of)	313,173	355,516	267,236	168,391	81,498	69,168	26,288	21,665	-	-
Italy	8,930,666	7,805,553	5,816,516	4,253,674	3,679,762	4,209,713	2,680,321	3,672,507	2,296,060	3,803,067
Netherlands 2/	3,371,223	3,165,223	2,227,688	1,490,630	1,672,070	2,311,963	1,676,795	2,288,799	1,780,606	2,565,003
United Kingdom	5,917	-	-	-	-	1,701	1,669,181	2,391,031	960,707	1,606,990
Total EEC	23,641,000	19,836,537	16,356,237	12,209,387	12,071,473	16,617,438	12,273,589	13,487,163	10,718,370	12,955,877
Austria	-	-	-	-	-	65,253	-	-	-	-
Germany (East)	120,616	157,558	77,365	101,475	86,766	395,630	38,680	19,779	-	-
Greece	26,378	-	-	-	-	-	65,567	-	37,699	40,767
Norway	164,663	220,686	265,876	306,316	269,367	197,580	93,256	167,056	126,288	165,233
Portugal	103,606	120,598	83,894	-	15,569	-	11,909	306,663	395,196	333,819
Romania	56,266	83,553	-	87,795	71,896	77,210	-	-	283,409	163,602
Spain	1,376,699	1,193,667	1,013,978	1,679,810	1,824,360	1,153,066	2,556,609	2,139,033	2,233,580	2,016,561
Sweden	870,398	951,280	813,261	360,667	667,661	763,536	617,932	426,828	367,286	199,627
Switzerland	38,016	24,116	38,669	78,766	-	-	31,803	-	-	-
Turkey	-	1,773	-	-	-	1,795	-	-	-	-
Yugoslavia	558,396	596,095	532,996	635,896	160,706	274,915	185,558	141,538	170,026	-
	26,958,670	22,987,135	19,361,305	15,402,661	15,088,151	21,396,319	16,402,683	16,678,360	14,751,848	15,855,088
Asia:										
Hong Kong	-	-	-	-	-	10,161	-	-	-	-
Israel	-	-	-	14,819	293	-	-	-	-	11,673
Japan	7,491,114	7,790,585	12,215,388	15,827,660	21,366,795	27,636,695	19,705,356	18,032,690	19,190,305	27,346,291
Korea (Rep. of)	-	-	6,878	-	-	-	-	-	190,370	265,566
Philippines	-	231	-	139	-	179	163	1,273	263	-
Other	57	39	-	66	1,070	26	836	59	-	711
	7,491,171	7,790,855	12,220,266	15,839,684	21,368,158	27,666,795*	19,706,361	18,038,981	19,381,138	27,603,689
Oceania:										
Australia	-	15,130	-	-	-	22,752	66	-	43,709	19
New Zealand	-	-	-	-	802	192	-	-	-	-
Other	-	-	-	-	-	-	-	37	-	-
	-	15,130	-	-	802	22,944	66	37	43,709	19
Africa:										
Canary Islands	2,177	-	-	-	-	-	-	-	-	-
Libya	-	-	-	-	-	60	-	-	-	-
Nigeria	1,912	5,730	6,066	-	-	-	-	-	-	-
Zaire	6,157	3,379	-	-	-	-	-	-	-	-
Other	310	309	-	100	-	37	-	-	243	[illegible]
	10,556	9,418	6,066	100	-	97	-	-	243	5
Total exports	50,181,361	49,302,380	49,527,878	50,637,260	56,233,680	70,441,558	56,632,986	55,996,721	52,870,402	59,926,088

*Does not include shipments to U.S. military forces.

1/ Preliminary figures.

2/ Shipments as indicated in vessel manifests upon departure from U.S. ports; includes tonnage for transshipment to undesignated European destinations.

Compiled by the Coal Exports Staff, Bureau of Mines.

(Source 37)

UNITED STATES exports of anthracite, by continental groups and countries of destination, 1965-74*

(Short tons)

Country of destination	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974 1/
North and Central America:										
Canada	642,657	626,289	419,766	401,316	477,761	438,908	466,039	499,106	477,692	481,365
Costa Rica	61	62	-	-	-	214	18	-	8	8
Haiti	-	-	7,742	-	-	-		-	-	-
Jamaica	61	-	151	150	37	114	-	301	-	750
Mexico	8,121	23,418	31,474	12,287	7,656	4,608	6,316	6,993	8,503	10,317
Panama	-	-	7,867	-	8	-	-	7	-	649
Trinidad and Tobago	115	125	561	-	-	-	114	-	118	-
Other	468	861	227	-	65	94	40	47	971	32
	651,517	648,822	471,568	413,791	485,517	443,988	472,275	507,616	487,092	492,601
South America:										
Argentina	3,086	3,771	1,660	1,797	6	2,236	4,906	2,733	3,216	-
Brazil	7,089	6,065	3,720	2,538	5,370	3,032	3,967	3,496	7,675	1,419
Chile	497	317	513	607	779	572	905	4,788	4,312	4,195
Colombia	479	127	177	392	75	36	358	493	515	3
Peru	-	-	-	168	2,973	6,196	-		8	-
Surinam	1,783	811	2,622	1,137	235	1,626	256	265	250	614
Venezuela	5,756	8,978	8,361	8,886	4,963	14,098	2,967	13,896	26,796	4,212
Other	45	31	-	-	-	9	153	-	119	389
	18,423	20,100	15,328	15,421	16,731	27,591	12,592	25,155	37,088	10,852
Europe:										
European Economic Community:										
Belgium-Luxembourg 2/	30,816	376	67	-	-	-	8	-	-	-
Denmark	93	353	-	88	-	5	-	-	219	-
France	79,881	4,861	1,279	666	317	228,635	101,530	97,776	105,511	165,966
Germany (West) 2/	92	-	-	66	41,091	7,860	26,248		28	51
Ireland (Rep. of)	-	-	-	-	1,763	1,589	-	-	-	-
Italy	39,093	31,636	45,627	58,380	60,443	60,968	229	37,661	38,008	18,470
Netherlands 2/	3,060	-	-	109	22,953	656	1,469	63,952	30,221	11,361
United Kingdom	1,377	800	-	96	10	1,366	11	-	90	33
Total EEC	154,296	41,873	46,948	59,295	186,777	301,022	129,306	187,389	173,157	195,867
Norway	77	7,295	-	-	-	-	-	-	-	-
Romania	-	10,251	10,398	-	-	525	-		-	
Spain	79,199	10,083	219	78	-	62	-	40	35	-
Sweden	-	-	-	-	-	-	66	9,260	9,606	1,271
Yugoslavia	-	426	166	895	13,862	316	11,591	10,487	-	
Other	208	-	357	53	63	232	455	98	532	180
	233,677	56,837	58,299	60,231	120,702	302,135	141,666	207,756	183,303	199,318
Asia:										
India	3,115	2,763	4,759	60	1,144	372	278	55	4,257	4
Indonesia	913	337	247	105	36	149	67	-	653	
Israel	168	31	73	-	-	-	-	-	11	-
Japan	-	7,447	8,218	3,850	-	176	13,363		-	24
Philippines	818	558	563	456	657	631	3,062	662	1,213	1,561
Singapore	-	-	-	-	-	-	4,149	-	-	162
Thailand	3,130	3,948	4,551	-	-	-	-	-	81	150
Vietnam (South)	40,185	16,806	24,261	22,001	-	10,609	2,713	-	-	1,595
Other	378	692	838	493	545	2,112	1,276	332	665	1,678
	49,692	28,582	43,318	25,214	4,378	13,957	25,366	1,369	6,660	5,184
Oceania:										
Australia	4,991	1,929	3,786	3,308	5,124	3,673	3,976	1,477	2,373	27,347
New Zealand	79	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	19	-	-	-
	5,070	1,929	3,786	3,308	5,124	3,673	3,995	1,477	2,373	27,347
Africa:										
Tunisia	56	-	-	-	-	-	-	-	-	-
Other	-	135	510	188	62	-	-	-	50	91
	56	135	510	188	62	-	-	-	50	91
Total Exports	958,435	766,075	586,757	518,159	627,497	789,499	671,026	747,451	716,566	735,373

*Does not include shipments to U.S. military forces.
1/ Preliminary figures.
2/ Shipments as indicated in vessel manifests upon departure from U.S. ports; includes tonnage for transshipment to undesignated European destinations.

Compiled by the Coal Exports Staff, Bureau of Mines.

(Source 37)

- UNITED STATES bituminous coal exports, in short tons and value*, 1970-1974

Country of destination	1970		1971		1972		1973		1974 1/	
	Tons	Value $	Tons	Value $	Tons	Value $	Tons	Value $	Tons	Value $
North and Central America:										
Canada	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Costa Rica	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Guatemala	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Honduras	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mexico	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miquelon and St. Pierre	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Panama	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trinidad and Tobago	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South America:										
Argentina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Brazil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chile	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Peru	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Uruguay	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Venezuela	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Europe:										
European Economic Community:										
Belgium-Luxembourg 2/	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
France	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Germany (West) 2/	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ireland (Republic of)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Italy	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Netherlands 2/	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
United Kingdom	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total EEC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Austria	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Germany (East)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Greece	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Norway	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Portugal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Romania	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spain	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sweden	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Switzerland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Yugoslavia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Asia:										
Hong Kong	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Japan	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Korea (Republic of)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Philippines	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oceania:										
Australia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Zealand	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Africa:										
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total exports	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* Includes transportation charges (mines to ports).
** Does not include shipments to U.S. military forces.
1/ Preliminary figures.
2/ Shipments as indicated on export manifests upon departure from U.S. ports; includes tonnage for transshipment to undesignated European destinations.
Compiled by the Coal Exports Staff, Bureau of Mines.

(Source 37)

- UNITED STATES anthracite exports, in short tons and value* 1970-1974**

Country of destination	1970		1971		1972		1973		1974 1/	
	Tons	U.S.$	Tons	U.S.$	Tons	U.S.$	Tons	U.S.$	Tons	U.S.$
North and Central America:										
Canada	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jamaica	[illegible]	[illegible]	-	-	[illegible]	[illegible]	-	-	[illegible]	[illegible]
Mexico	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trinidad and Tobago	-	-	[illegible]	[illegible]	-	-	[illegible]	[illegible]	-	-
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South America:										
Argentina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-
Brazil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chile	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Colombia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Peru	[illegible]	[illegible]	-	-	-	-	[illegible]	[illegible]	-	-
Surinam	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Venezuela	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Europe:										
European Economic Community:										
Belgium-Luxembourg 2/	-	-	[illegible]	[illegible]	-	-	-	-	-	-
Denmark	[illegible]	[illegible]	-	-	-	-	[illegible]	[illegible]	-	-
France	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Germany (West) 2/	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]
Ireland (Republic of)	[illegible]	[illegible]	-	-	-	-	-	-	-	-
Italy	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Netherlands 2/	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
United Kingdom	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]
Total EEC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Finland	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]
Romania	[illegible]	[illegible]	-	-	-	-	-	-	-	-
Spain	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]	-	-
Sweden	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Yugoslavia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Asia:										
India	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Indonesia	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	-	-
Japan	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	[illegible]	[illegible]
Philippines	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Singapore	-	-	[illegible]	[illegible]	-	-	-	-	[illegible]	[illegible]
Vietnam (South)	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oceania:										
Australia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	-	-	[illegible]	[illegible]	-	-	-	-	-	-
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Africa:										
Other	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]
Total exports	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* Includes transportation charges (mines to ports).
** Does not include shipments to U.S. military forces.
1/ Preliminary figures.
2/ Shipments as indicated in vessel manifests upon departure from U.S. ports. Includes tonnage for transshipment to undesignated European destinations.
Compiled by the Coal Exports Staff, Bureau of Mines.

(Source 3)

Bituminous coal 1/ imported for consumption in the United States, by country and customs district

(Short tons and thousand dollars)

Country and customs district	1971		1972		1973	
	Quantity	Value	Quantity	Value	Quantity	Value
Country:						
Australia	--	--	1,120	49	--	--
Canada	87,447	1,064	44,821	621	113,884	1,491
Colombia	171	(2)	--	--	--	--
Germany, West	103	1	--	--	59	1
India	37	3	--	--	--	--
Japan	--	--	20	2	--	--
Poland	--	--	--	--	12,698	115
South Africa, Republic of	11,417	434	1,127	18	--	--
Sweden	11,861	290	--	--	--	--
United Kingdom	--	--	10	1	--	--
Other	(2)	(2)	--	--	--	--
Total	111,036	1,772	47,098	691	126,641	1,607
Customs district:						
Boston	--	--	--	--	12,698	115
Buffalo	977	10	--	--	437	8
Chicago	73	(2)	--	--	403	6
Detroit	47,698	525	--	--	73,152	897
Duluth	9,584	142	16,393	246	25,076	377
Great Falls	11,844	109	7,492	61	2,143	13
Honolulu	--	--	20	2	--	--
Houston	--	--	1,120	49	--	--
New Orleans	23,278	724	1,127	18	--	--
New York City	37	3	10	1	--	--
Norfolk	--	--	--	--	12,521	188
Ogdensburg	--	--	--	--	144	2
Pembina	16,902	253	20,921	313	59	1
Portland, Me	--	--	15	1	8	(2)
Portland, Oreg	171	(2)	--	--	--	--
San Francisco	30	(2)	(2)	(2)	--	--
Seattle	442	6	--	--	--	--
Total	111,036	1,772	47,098	691	126,641	1,607

1/ Includes slack, culm, and lignite.
2/ Less than ½ unit.

(Source 3)

Exports of bituminous coal, by country group

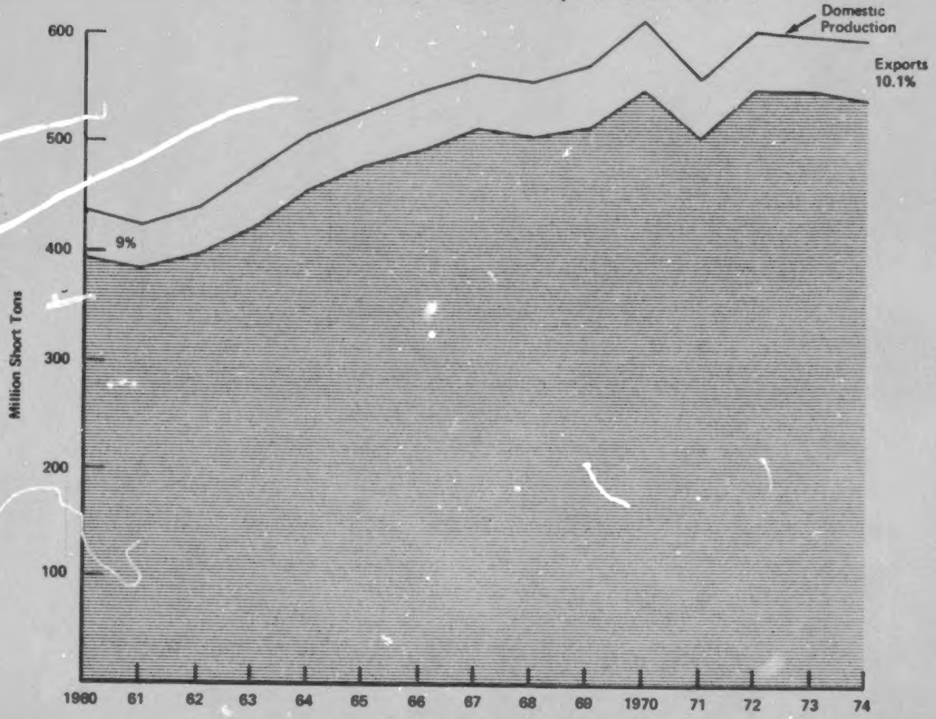
(Thousand short tons and thousand dollars)

Country group	1971		1972		1973	
	Quantity	Value	Quantity	Value	Quantity	Value
Canada (including Newfoundland and Mexico	17,852	208,795	18,627	264,575	16,569	253,011
Overseas (all other countries):						
West Indies and Central America	--	--	--	--	(1)	1
Bermuda, Greenland, Miquelon, St. Pierre Islands	(1)	10	1	17	2	32
South America	2,673	49,092	2,651	51,497	2,654	54,154
Europe	16,403	280,943	16,679	307,647	14,253	290,327
Asia	19,705	352,644	r18,039	r349,453	19,381	403,954
Africa	--	--	--	--	(1)	5
Oceania	(1)	(1)	(1)	(1)	44	973
Total	38,781	682,689	r37,370	r708,614	36,334	749,446
Grand total	56,633	891,484	r55,997	r973,189	52,903	1,002,457

1/ Less than ½ unit.

(Source 17)

U.S. Coal Production and Exports, 1960-74



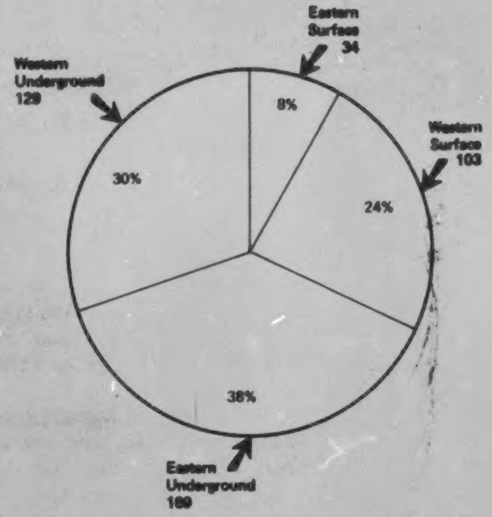
UNITED STATES RESERVES

(Source 17)

U.S. Demonstrated Coal Reserve Base, January 1974

(Billions of Short Tons)

TOTAL: 434



(Source 10)

ESTIMATED UNITED STATES SUPPLY FUNCTION FOR COAL
(Including Bituminous, Subbituminous, Lignite, Anthracite)

Remaining Identified Resources 1/	Million Short Tons	Quadrillion Btu
Total All Ranks	1,577,000	31,124
Low Sulfur 0-1%	1,022,000	17,854
Medium Sulfur 1.1-3%	240,000	5,451
High Sulfur > 3%	315,000	7,819
Anthracite	15,000	381
Bituminous	725,000	18,037
Subbituminous	389,000	6,613
Lignite	448,000	6,093
Proved Recoverable Reserves 2/		
Total All Ranks	184,000	4,054
Anthracite	1,000	234
Bituminous and Subbituminous	155,000	3,436
Lignite	28,000	384

1/ Remaining identified resources that could be made available under certain technical and economic conditions. For coal this represents the total resource base reduced by a recovery factor of 50 percent. Estimates of sulfur content are based on calculations of the sulfur content of the total resource base and components.

2/ Measured reserves recoverable under existing economic and operating conditions.

Sources: Energy Resources of the United States, U.S. Geological Survey Circular 650, U.S. Geological Survey, Washington, D.C., 1972; Coal Resources of the United States, U.S. Geological Survey Bulletin 1275, Washington, D.C., 1967; U.S. Department of the Interior, Bureau of Mines, Commodity Data Summaries, 1974; Interagency Coal Task Force, Reserve Base Preliminary Data, 1974.

Prepared by: Office of Economics, Federal Power Commission.

3/ Author's note: Under proved recoverable reserves, total all ranks, the Bureau of Mines has a far larger reserve figure. According to the Federal Power Commission, this is apparently due to their not having considered the economics of recovery.

(Source 3)

Demonstrated Reserve Base 1/ of Coals in the United States on January 1, 1974 potentially minable by Underground Methods

(Million short tons)

State	Anthracite	Bituminous	Subbituminous	Lignite	Total
Alabama	-----	1,798	-----	-----	1,798
Alaska	-----	-----	4,246	-----	4,246
Arkansas	96	306	-----	-----	402
Colorado	28	9,227	4,745	-----	14,000
Georgia	-----	1	-----	-----	1
Illinois	-----	53,442	-----	-----	53,442
Indiana	-----	8,949	-----	-----	8,949
Iowa	-----	2,885	-----	-----	2,885
Kentucky, East	-----	9,467	-----	-----	9,467
Kentucky, West	-----	8,720	-----	-----	8,720
Maryland	-----	902	-----	-----	902
Michigan	-----	118	-----	-----	118
Missouri	-----	6,074	-----	-----	6,074
Montana	-----	1,384	63,781	-----	65,165
New Mexico	2	1,527	607	-----	2,136
North Carolina	-----	31	-----	-----	31
Ohio	-----	17,423	-----	-----	17,423
Oklahoma	-----	860	-----	-----	860
Oregon	-----	-----	1	-----	1
Pennsylvania	7,030	22,789	-----	-----	29,819
Tennessee	-----	667	-----	-----	667
Utah	-----	3,780	-----	-----	3,780
Virginia	138	2,833	-----	-----	2,971
Washington	-----	251	1,195	-----	1,446
West Virginia	-----	34,378	-----	-----	34,378
Wyoming	-----	4,524	23,030	-----	27,554
Total	7,294	192,336	97,605	-----	297,235

1/ Includes measured and indicated categories as defined by the USBM and USGS and represents 100% of the coal inplace.

(Source 3)

Demonstrated Reserve Base 1/ of Coals in the United States
on January 1, 1974 potentially minable by Surface Methods
(Million short tons)

State	Anthracite	Bituminous	Subbituminous	Lignite	Total
Alabama	-----	157	-----	1,027	1,184
Alaska	-----	1,201	5,902	296	7,399
Arizona	-----	-----	350	-----	350
Arkansas	-----	231	-----	32	263
Colorado	-----	870	-----	-----	870
Illinois	-----	12,223	-----	-----	12,223
Indiana	-----	1,674	-----	-----	1,674
Kansas	-----	1,388	-----	-----	1,388
Kentucky, East	-----	3,450	-----	-----	3,450
Kentucky, West	-----	3,904	-----	-----	3,904
Maryland	-----	146	-----	-----	146
Michigan	-----	1	-----	-----	1
Missouri	-----	3,414	-----	-----	3,414
Montana	-----	-----	35,431	7,131	42,562
New Mexico	-----	250	2,008	-----	2,258
North Carolina	-----	2/	-----	-----	2/
North Dakota	-----	-----	-----	16,003	16,003
Ohio	-----	3,654	-----	-----	3,654
Oklahoma	-----	434	-----	-----	434
Oregon	-----	2/	2/	-----	2/
Pennsylvania	90	1,091	-----	-----	1,181
South Dakota	-----	-----	-----	428	428
Tennessee	-----	320	-----	-----	320
Texas	-----	-----	-----	3,272	3,272
Utah	-----	262	-----	-----	262
Virginia	-----	679	-----	-----	679
Washington	-----	-----	500	8	508
West Virginia	-----	5,212	-----	-----	5,212
Wyoming	-----	-----	23,674	-----	23,674
Total	90	40,561	67,865	28,197	136,713

1/ Includes measured and indicated categories as defined by the USBM and USGS and represents 100% of the coal inplace.

2/ Less than 1 million tons.

(Source 3)

Demonstrated Coal Reserve Base 1/ of the United States on January 1, 1974 by Method of Mining

(Million short tons)

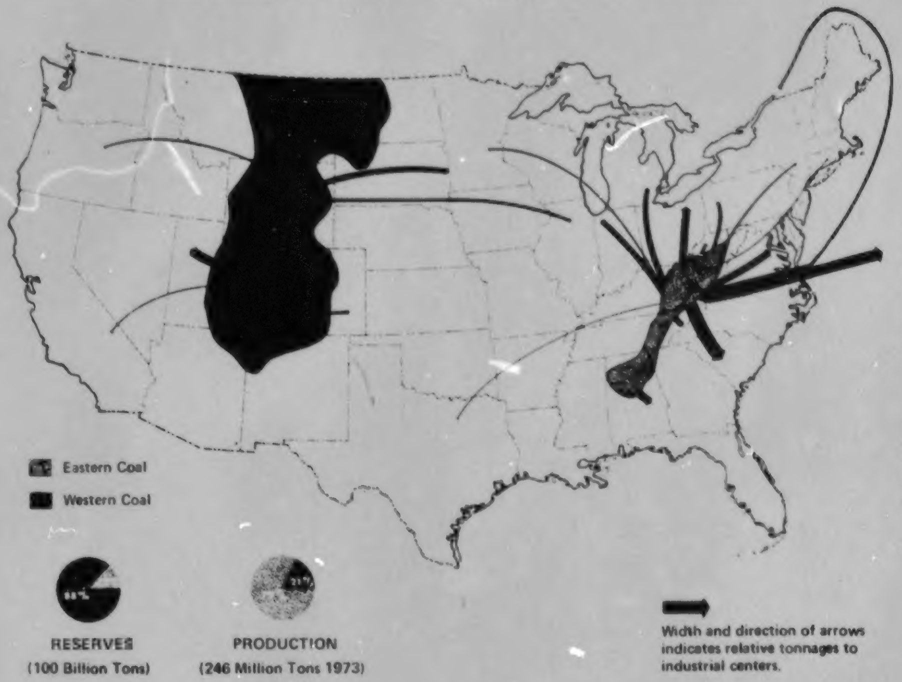
State	Potential mining method		Total
	Underground	Surface	
Alabama	1,798	1,184	2,982
Alaska	4,246	7,399	11,645
Arizona	---	350	350
Arkansas	402	263	665
Colorado	14,000	870	14,870
Georgia	1	---	1
Illinois	53,442	12,223	65,665
Indiana	8,949	1,674	10,623
Iowa	2,885	---	2,885
Kansas	---	1,388	1,388
Kentucky, East	9,467	3,450	12,917
Kentucky, West	8,720	3,904	12,624
Maryland	902	146	1,048
Michigan	118	1	119
Missouri	6,074	3,414	9,488
Montana	65,165	42,562	107,727
New Mexico	2,136	2,258	4,394
North Carolina	31	2/	31
North Dakota	---	16,003	16,003
Ohio	17,423	3,654	21,077
Oklahoma	860	434	1,294
Oregon	1	2/	1
Pennsylvania	29,819	1,181	31,000
South Dakota	---	428	428
Tennessee	667	320	987
Texas	---	3,272	3,272
Utah	3,780	262	4,042
Virginia	2,971	679	3,650
Washington	1,446	508	1,954
West Virginia	34,378	5,212	39,590
Wyoming	27,554	23,674	51,228
Total	297,235	136,713	433,948

1/ Includes measured and indicated categories as defined by the USBM and USGS and represents 100% of the coal inplace.

2/ Less than 1 million tons

(Source 17)

U.S. Low-Sulfur Coal Reserves, Production, Distribution, 1973


Eastern Coal
Western Coal
21%
RESERVES
(100 Billion Tons)
PRODUCTION
(246 Million Tons 1973)
Width and direction of arrows indicates relative tonnages to industrial centers.

UNITED STATES PRODUCTION

(Source 3)

Production of bituminous coal and lignite in the United States, with estimates by weeks

(Thousand short tons)

Week ended	Production 1972	Maximum number of working days	Average production per working day	Week ended	Production 1973	Maximum number of working days	Average production per working day
Jan. 8 ----------	11,696	6	1,949	Jan. 6 ----------	9,307	5	1,861
Jan. 15 ----------	12,125	6	2,021	Jan. 13 ----------	10,503	6	1,751
Jan. 22 ----------	11,691	6	1,949	Jan. 20 ----------	11,346	6	1,891
Jan. 29 ----------	12,015	6	2,003	Jan. 27 ----------	11,556	6	1,926
Feb. 5 ----------	11,645	6	1,941	Feb. 3 ----------	11,787	6	1,965
Feb. 12 ----------	11,712	6	1,952	Feb. 10 ----------	10,974	6	1,829
Feb. 19 ----------	12,069	6	2,012	Feb. 17 ----------	11,349	6	1,892
Feb. 26 ----------	11,502	6	1,917	Feb. 24 ----------	11,510	6	1,918
Mar. 4 ----------	10,999	6	1,833	Mar. 3 ----------	12,101	6	2,017
Mar. 11 ----------	11,462	6	1,910	Mar. 10 ----------	11,585	6	1,931
Mar. 18 ----------	11,838	6	1,973	Mar. 17 ----------	10,901	6	1,817
Mar. 25 ----------	12,466	6	2,078	Mar. 24 ----------	10,906	6	1,818
Apr. 1 ----------	12,010	5.3	2,266	Mar. 31 ----------	11,994	6	1,999
Apr. 8 ----------	12,483	6	2,081	Apr. 7 ----------	10,276	5	2,055
Apr. 15 ----------	12,190	6	2,032	Apr. 14 ----------	11,360	6	1,893
Apr. 22 ----------	12,469	6	2,078	Apr. 21 ----------	11,325	6	1,888
Apr. 29 ----------	12,672	6	2,112	Apr. 28 ----------	11,805	6	1,968
May 6 ----------	11,372	6	1,895	May 5 ----------	11,345	6	1,891
May 13 ----------	11,502	6	1,917	May 12 ----------	11,229	6	1,872
May 20 ----------	11,990	6	1,998	May 19 ----------	11,595	6	1,933
May 27 ----------	12,125	6	2,021	May 26 ----------	11,527	6	1,921
June 3 ----------	10,765	5	2,153	June 2 ----------	10,672	5	2,134
June 10 ----------	13,206	6	2,201	June 9 ----------	12,090	6	2,015
June 17 ----------	13,191	6	2,199	June 16 ----------	12,781	6	2,130
June 24 ----------	12,521	6	2,087	June 23 ----------	12,650	6	2,108
July 1 ----------	6,624	3.1	2,137	June 30 ----------	6,377	3.1	2,057
July 8 ----------	4,438	2.1	2,113	July 7 ----------	4,626	2.3	2,011
July 15 ----------	10,475	4.8	2,182	July 14 ----------	10,664	5.2	2,051
July 22 ----------	11,605	6	1,934	July 21 ----------	11,938	6	1,990
July 29 ----------	11,889	6	1,982	July 28 ----------	12,025	6	2,004
Aug. 5 ----------	11,340	6	1,890	Aug. 4 ----------	11,917	6	1,986
Aug. 12 ----------	11,900	6	1,983	Aug. 11 ----------	12,415	6	2,069
Aug. 19 ----------	11,419	6	1,903	Aug. 18 ----------	12,042	6	2,007
Aug. 26 ----------	11,002	6	1,834	Aug. 25 ----------	12,350	6	2,058
Sept. 2 ----------	11,604	6	1,934	Sept. 1 ----------	12,327	6	2,055
Sept. 9 ----------	10,289	5	2,058	Sept. 8 ----------	10,147	5	2,029
Sept. 16 ----------	11,966	6	1,994	Sept. 15 ----------	12,196	6	2,033
Sept. 23 ----------	12,280	6	2,047	Sept. 22 ----------	12,582	6	2,097
Sept. 30 ----------	11,966	6	1,994	Sept. 29 ----------	12,784	6	2,131
Oct. 7 ----------	11,569	6	1,928	Oct. 6 ----------	11,862	6	1,977
Oct. 14 ----------	12,120	6	2,020	Oct. 13 ----------	11,959	6	1,993
Oct. 21 ----------	11,702	5	2,340	Oct. 20 ----------	11,911	5	2,382
Oct. 28 ----------	11,773	6	1,962	Oct. 27 ----------	11,989	6	1,998
Nov. 4 ----------	11,899	6	1,983	Nov. 3 ----------	11,745	6	1,958
Nov. 11 ----------	11,914	6	1,986	Nov. 10 ----------	12,048	6	2,008
Nov. 18 ----------	12,042	6	2,007	Nov. 17 ----------	11,502	6	1,917
Nov. 25 ----------	10,177	5	2,035	Nov. 24 ----------	10,298	5	2,060
Dec. 2 ----------	11,637	6	1,940	Dec. 1 ----------	11,526	6	1,921
Dec. 9 ----------	11,620	6	1,937	Dec. 8 ----------	13,149	6	2,192
Dec. 16 ----------	10,850	6	1,808	Dec. 15 ----------	13,082	6	2,180
Dec. 23 ----------	10,541	6	1,757	Dec. 22 ----------	11,653	6	1,942
Dec. 30 ----------	9,028	5	1,806	Dec. 29 ----------	8,229	5	1,646
				Jan. 5 ----------	1/1,923	1/ 1	2/ 1,923
Total or average 3/	595,386	298.3	1,996		591,738	298.6	1,982

1/ Figures represent production and number of working days in that part of week included in calendar year shown.
2/ Average daily output for the working days in the calendar year shown.
3/ Data may not add to totals shown because of independent rounding.

(Source 3)

Production of bituminous coal and lignite, by State, with estimates by months 1/

(Thousand short tons)

States	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Alabama	1,644	1,562	1,756	1,359	1,629	1,374	1,511	1,776	1,578	1,583	1,666	1,384	19,730
Alaska	62	58	64	53	59	50	60	58	56	54	57	62	694
Arizona	250	219	292	276	255	282	273	321	249	405	292	243	3,247
Arkansas	46	25	[illegible]	43	58	49	25	30	29	38	37	[illegible]	434
Colorado	523	500	802	692	556	465	362	644	535	569	567	567	6,233
Illinois	5,548	5,282	5,212	4,525	5,247	4,590	4,871	6,098	5,364	5,032	4,409	4,996	61,572
Indiana	1,760	1,876	2,255	2,138	2,238	2,073	1,808	2,929	2,449	2,178	1,905	1,643	25,253
Iowa	49	53	49	49	48	53	59	57	47	60	44	41	603
Kansas	88	82	96	99	73	97	98	98	103	97	92	75	1,096
Kentucky:													
Eastern	6,133	5,406	6,203	6,197	7,018	6,540	5,402	6,885	5,867	6,780	5,925	5,610	73,966
Western	4,733	4,232	4,544	4,307	4,575	4,821	4,138	4,693	4,084	4,864	4,536	4,152	53,679
Total	10,866	9,638	10,747	10,504	11,593	11,361	9,540	11,578	9,951	11,644	10,461	9,762	127,645
Maryland	129	129	139	142	142	161	136	119	176	202	227	161	1,769
Missouri	357	284	319	252	313	338	345	663	442	513	476	376	4,658
Montana:													
Bituminous	662	667	832	730	780	733	606	1,026	925	1,175	1,184	1,101	10,411
Lignite	70	70	25	22	24	22	18	31	27	35	36	33	313
Total	732	737	857	752	804	755	624	1,057	952	1,210	1,220	1,134	10,724
New Mexico	488	536	757	606	612	588	685	1,168	941	1,303	1,039	738	9,069
North Dakota (lignite)	624	618	[illegible]	624	622	583	383	536	499	608	579	558	6,906
Ohio	3,452	3,743	3,917	3,760	4,254	3,900	3,603	4,198	3,675	4,017	3,732	3,206	45,783
Oklahoma	152	141	136	174	179	158	155	230	218	259	210	171	2,193
Pennsylvania	6,807	6,261	6,710	6,052	6,801	5,602	5,552	6,707	6,187	7,184	5,512	6,122	76,403
Tennessee	677	665	574	585	792	904	444	641	635	844	940	718	8,219
Texas	390	370	380	375	400	435	798	834	684	838	802	619	6,944
Utah	449	567	473	455	473	477	323	526	409	474	438	450	5,500
Virginia	2,836	2,581	2,882	2,920	3,091	2,633	2,443	3,257	2,725	3,158	2,637	2,394	33,961
Washington	225	261	249	274	284	279	317	312	297	274	261	237	3,270
West Virginia	10,029	9,013	10,467	9,263	10,093	8,391	8,257	10,732	9,926	10,271	8,827	11,102	115,448
Wyoming	846	728	1,014	996	986	1,195	1,162	1,353	1,299	1,768	1,829	1,595	14,886
Total 2/	49,379	45,093	50,547	46,999	51,430	46,613	43,801	55,874	48,138	54,382	49,826	[illegible]	593,738

1/ Figures are based principally upon railroad carloadings and river shipments supplemented by direct reports from certain local sources. These estimates include coal both shipped by truck, and used at the mines, and the totals represent output for all mines producing 1,000 tons or more per year.
2/ Data may not add exactly to totals shown because of independent rounding.

(Source 3)

Production of bituminous coal and lignite in the United States, by State and underground, strip, and auger mining

(Thousand short tons)

State	Underground	Strip	Auger	Total 1/
Alabama	7,618	11,529	84	19,230
Alaska	---	694	---	694
Arizona	---	3,247	---	3,247
Arkansas	3	432	---	434
Colorado	3,361	2,834	38	6,233
Illinois	32,570	29,002	---	61,572
Indiana	789	24,465	---	25,253
Iowa	356	245	---	601
Kansas	---	1,086	---	1,086
Kentucky:				
Eastern	40,553	23,671	9,742	73,966
Western	22,342	31,337	---	53,679
Total	62,895	55,008	9,742	127,645
Maryland	66	1,643	79	1,789
Missouri	---	4,658	---	4,658
Montana:				
Bituminous	1	10,410	---	10,411
Lignite	---	314	---	314
Total	1	10,724	---	10,725
New Mexico	733	8,336	---	9,069
North Dakota (lignite)	---	6,906	---	6,906
Ohio	16,225	28,527	1,031	45,783
Oklahoma	---	2,183	---	2,183
Pennsylvania	46,207	29,829	366	76,403
Tennessee	3,636	4,236	348	8,219
Texas (lignite)	---	6,944	---	6,944
Utah	5,500	---	---	5,500
Virginia	23,437	8,700	1,824	33,961
Washington	16	3,254	---	3,270
West Virginia	95,516	17,704	2,228	115,448
Wyoming	425	14,461	---	14,886
Total 1/	299,353	276,645	15,739	591,738

1/ Data may not add to totals shown because of independent rounding.

(Source 3)

Production of bituminous coal and lignite in the United States, by districts, and by underground, strip, and auger mining

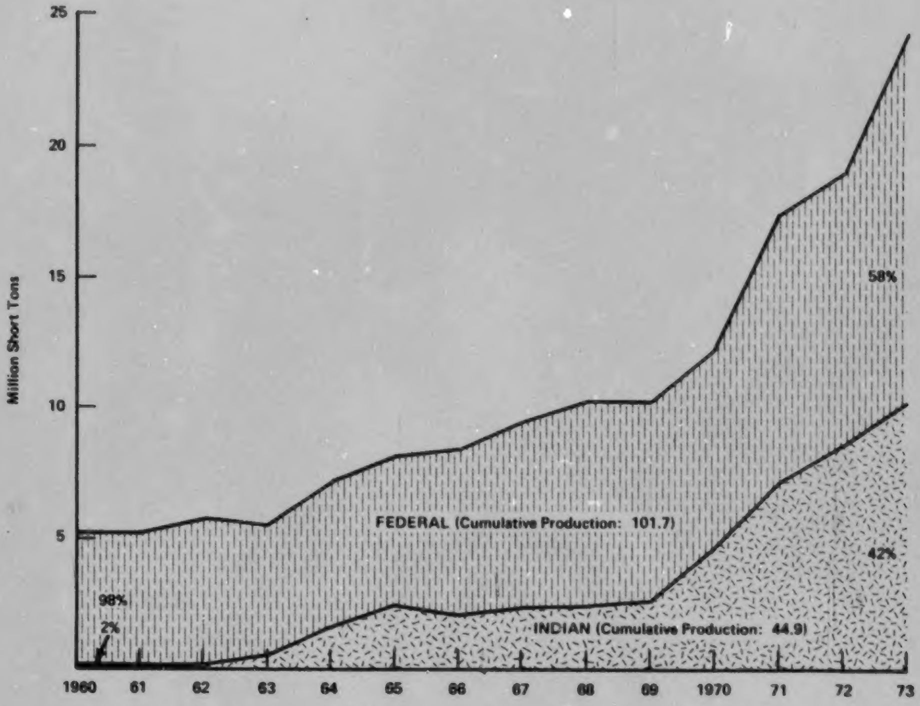
(Thousand short tons)

District	Underground	Strip	Auger	Total 1/
1. Eastern Pennsylvania	21,100	25,061	285	46,445
2. Western Pennsylvania	26,728	7,043	161	33,932
3. Northern West Virginia	25,563	8,454	431	34,447
4. Ohio	16,225	28,527	1,031	45,783
5. Michigan	---	---	---	---
6. Panhandle	8,711	120	22	8,853
7. Southern Numbered 1	27,067	2,836	493	30,395
8. Southern Numbered 2	99,592	41,848	13,174	154,614
9. West Kentucky	22,342	31,337	---	53,679
10. Illinois	32,570	29,002	---	61,572
11. Indiana	789	24,465	---	25,253
12. Iowa	356	245	---	601
13. Southeastern	8,273	11,951	105	20,329
14. Arkansas-Oklahoma	3	773	---	776
15. Southwestern	---	14,528	---	14,528
16. Northern Colorado	510	---	---	510
17. Southern Colorado	3,584	3,026	38	6,648
18. New Mexico	---	11,391	---	11,391
19. Wyoming	425	14,461	---	14,886
20. Utah	5,500	---	---	5,500
21. North-South Dakota	---	6,906	---	6,906
22. Montana	1	10,724	---	10,725
23. Washington	16	3,948	---	3,964
Total 1/	299,353	276,645	15,739	591,738

1/ Data may not addto totals shown because of independent rounding.

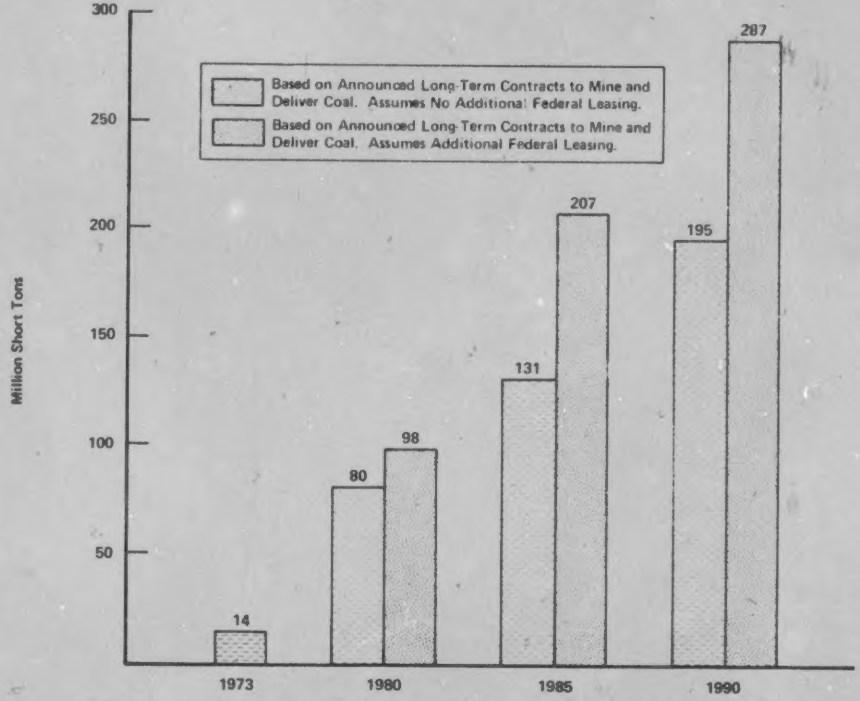
(Source 17)

U.S. Coal Production, Federal and Indian Lands, 1960-1974



(Source 17)

U.S. Potential Production of Coal on Federal Leases, 1973-90



(Source 3)

Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, in 1973, by States

State	Number of active mines	Production (Thousand short tons) Shipped by rail or water 1/	Shipped by truck	Mine-mouth generating plants	All others 2/	Total 3/	Average value per ton 4/	Average number of men working daily	Average number of days worked	Number of man-days worked (thousands)	Average tons per man per day
Alabama	105	14,304	3,003	1,915	8	19,230	$11.01	5,098	239	1,218	15.79
Alaska	1	579	115	---	---	694	W	74	277	20	33.86
Arizona	1	---	---	---	3,247	3,247	W	161	297	48	67.90
Arkansas	11	414	20	---	5/	434	13.37	157	224	35	12.35
Colorado	30	4,853	746	630	4	6,233	7.41	1,418	252	357	17.46
Illinois	55	53,711	3,393	4,399	70	61,572	6.71	10,500	249	2,613	23.56
Indiana	39	21,129	3,682	411	31	25,253	6.06	2,680	262	702	35.98
Iowa	12	161	439	---	---	601	5.46	128	221	28	21.20
Kansas	4	1,009	74	---	3	1,086	7.35	228	294	67	16.20
Kentucky:											
Eastern	1,362	69,071	4,729	---	167	73,966	9.03	20,499	199	4,080	18.13
Western	81	43,584	1,365	8,707	23	53,679	5.93	7,476	256	1,916	28.02
Total 3/	1,443	112,655	6,094	8,707	190	127,645	7.73	27,975	214	5,996	21.29
Maryland	56	1,235	553	---	---	1,789	7.63	322	197	63	28.20
Missouri	10	1,260	90	3,307	---	4,658	5.37	579	265	153	30.39
Montana:											
Bituminous	7	10,339	22	---	W	10,411	2.83	270	292	79	132.26
Lignite	2	313	2	---	---	314	2.60	22	257	6	55.55
Total 3/	9	10,652	23	---	W	10,725	2.82	292	289	84	127.11
New Mexico	6	1,391	3	7,676	---	9,069	3.51	719	258	186	48.84
North Dakota (lignite)	12	3,705	50	2,998	153	6,906	2.07	265	255	67	102.36
Ohio	235	28,871	11,555	5,343	14	45,783	7.40	9,700	222	2,153	21.26
Oklahoma	11	2,060	122	---	1	2,183	7.69	380	290	110	19.82
Pennsylvania	964	51,223	17,824	7,246	110	76,403	10.30	25,373	240	6,102	12.52
Tennessee	119	5,601	2,618	---	---	8,219	8.13	1,934	207	400	20.54
Texas (lignite)	3	---	W	W	---	6,944	W	215	321	69	100.75
Utah	16	4,001	1,492	---	7	5,500	11.19	1,603	239	383	14.36
Virginia	650	32,673	1,285	---	3	33,961	11.12	12,226	220	2,685	12.65
Washington	3	---	24	3,246	---	3,270	6.56	318	264	84	38.90
West Virginia	932	105,174	3,776	6,188	311	115,448	11.61	44,765	218	9,762	11.83
Wyoming	17	9,100	45	5,658	84	14,886	4.09	1,011	263	266	55.94
Total 3/	4,744	465,762	57,268	64,424	4,284	591,738	8.53	148,121	227	33,653	17.58

W Withheld to avoid disclosing individual company confidential data.

1/ Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad siding, and hauled by trucks to waterways.

2/ Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for other purposes at mine, and shipped by slurry pipeline in Arizona.

3/ Data may not add to totals shown because of independent rounding.

4/ Value received or charged for coal, f.o.b. mine. Includes a value, estimated by producer, for coal not sold.

5/ Less than 500 tons.

(Source 3)

Number of mines, men working daily, days active, and output per man per day at bituminous coal and lignite mines in the United States, in 1973, by State

State	Number of mines			Average number of men working daily				Average number of days worked			Average tons per man per day			
	Underground	Strip	Auger	Underground	Strip	Auger	Total	Underground	Strip	Auger	Underground	Strip	Auger	Total
Alabama	21	83	1	3,274	1,818	6	5,098	235	246	260	9.91	25.76	53.61	15.79
Alaska	-----	1	-----	-----	74	-----	74	-----	277	-----	-----	33.86	-----	33.86
Arizona	-----	1	-----	-----	161	-----	161	-----	297	-----	-----	67.90	-----	67.90
Arkansas	1	10	-----	5	152	-----	157	109	228	-----	4.60	12.47	------	12.35
Colorado	21	8	1	1,223	186	9	1,418	251	262	98	10.93	58.15	43.62	17.46
Illinois	23	32	-----	7,229	3,271	-----	10,500	249	248	-----	18.07	35.80	-----	23.56
Indiana	3	36	-----	240	2,440	-----	2,680	175	270	-----	18.74	37.08	-----	35.98
Iowa	2	16	-----	53	75	-----	128	292	171	-----	22.98	19.06	-----	21.20
Kansas	-----	4	-----	-----	228	-----	228	-----	294	-----	-----	16.20	-----	16.20
Kentucky:														
Eastern	584	399	379	14,868	4,153	1,478	20,499	215	164	139	12.70	34.75	47.46	18.13
Western	26	55	-----	4,716	2,760	-----	7,476	259	252	-----	18.32	45.01	-----	28.02
Total	610	454	379	19,584	6,913	1,478	27,975	225	199	139	14.25	39.94	47.46	21.29
Maryland	2	46	8	15	292	15	322	194	198	190	22.84	28.48	27.83	28.20
Missouri	-----	10	-----	-----	579	-----	579	-----	265	-----	-----	30.39	-----	30.39
Montana:														
Bituminous	1	6	-----	5	265	-----	270	52	298	-----	4.06	132.68	-----	132.26
Lignite	-----	2	-----	-----	22	-----	22	-----	257	-----	-----	55.55	-----	55.55
Total	1	8	-----	5	287	-----	292	52	293	-----	4.06	127.50	-----	127.11
New Mexico	1	5	-----	239	480	-----	719	239	268	-----	12.82	64.86	-----	48.84
North Dakota (lignite)	-----	12	-----	-----	265	-----	265	-----	255	-----	-----	102.36	-----	102.36
Ohio	28	176	31	5,982	3,587	131	9,700	228	216	114	11.89	36.88	69.15	21.26
Oklahoma	-----	11	-----	-----	380	-----	380	-----	290	-----	-----	19.82	-----	19.82
Pennsylvania	134	775	55	19,440	5,772	161	25,373	247	224	71	9.63	23.11	32.15	12.52
Tennessee	46	64	9	1,170	720	44	1,934	215	196	168	14.46	29.99	46.95	20.54
Texas (lignite)	-----	3	-----	-----	215	-----	215	-----	321	-----	-----	100.75	-----	100.75
Utah	16	-----	-----	1,603	-----	-----	1,603	239	-----	-----	14.36	-----	-----	14.36
Virginia	300	242	108	10,700	1,263	263	12,226	221	224	145	9.91	30.81	47.75	12.65
Washington	1	2	-----	16	302	-----	318	194	268	-----	5.26	40.19	-----	38.90
West Virginia	522	304	106	40,137	3,900	728	44,765	226	162	89	10.53	28.11	34.39	11.83
Wyoming	5	12	-----	168	843	-----	1,011	241	268	-----	10.49	64.11	-----	55.94
Total	1,737	2,309	698	111,083	34,203	2,835	148,121	231	223	122	11.66	36.30	45.33	17.58

(Source 3)

Production at underground bituminous coal mines,
by State and method of loading

(Thousand short tons)

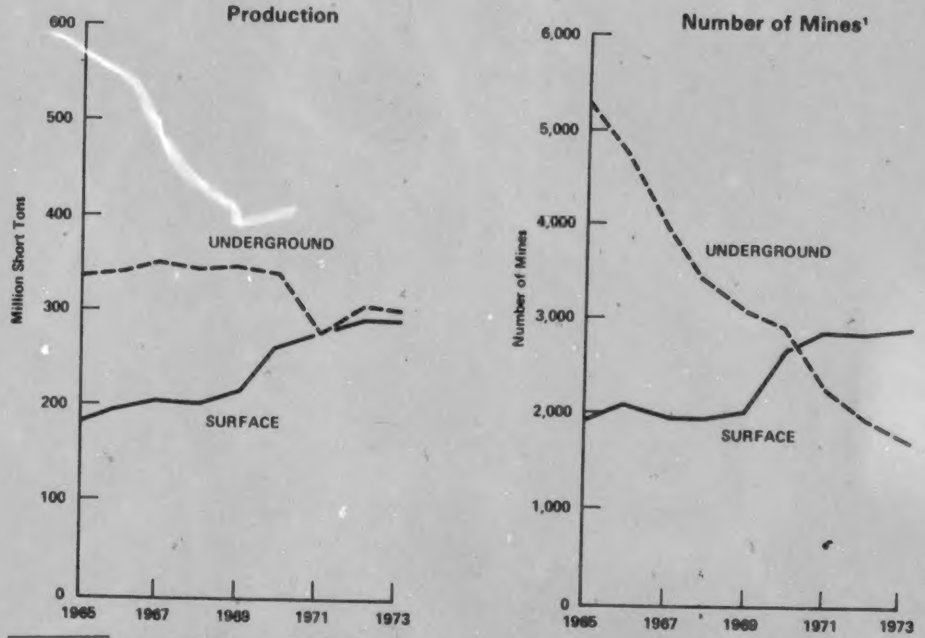
State	Hand-loaded		Mechanically loaded		Total underground production	
	1972	1973	1972	1973	1972	1973
Alabama	61	42	7,527	7,576	7,588	7,618
Arkansas	8	3	---	---	8	3
Colorado	17	13	3,053	3,347	3,070	3,361
Illinois	---	---	31,721	32,570	31,721	32,570
Indiana	---	---	1,446	789	1,446	789
Iowa	---	---	352	356	352	356
Kentucky:						
Eastern	1,617	1,012	36,329	39,540	37,946	40,553
Western	---	---	18,547	22,342	18,547	22,342
Total	1,617	1,012	54,877	61,883	56,494	62,895
Maryland	7	---	135	66	141	66
Montana	9	1	7	---	17	1
New Mexico	---	---	1,014	733	1,014	733
Ohio	10	---	16,260	16,225	16,269	16,225
Oklahoma	---	---	88	---	88	---
Pennsylvania	135	104	48,998	46,103	49,133	46,207
Tennessee	179	40	5,687	3,596	5,866	3,636
Utah	---	---	4,770	5,500	4,770	5,500
Virginia	27	270	23,967	23,167	23,993	23,437
Washington	---	---	29	16	29	16
West Virginia	901	482	100,762	95,034	101,662	95,516
Wyoming	3	3	438	422	442	425
Total 1/	2,974	1,970	301,129	297,384	304,103	299,353

1/ Data may not add to totals shown because of independent rounding.

(Source 17)

U.S. Coal Trends, 1965-73

(Bituminous Coal and Lignite)



---

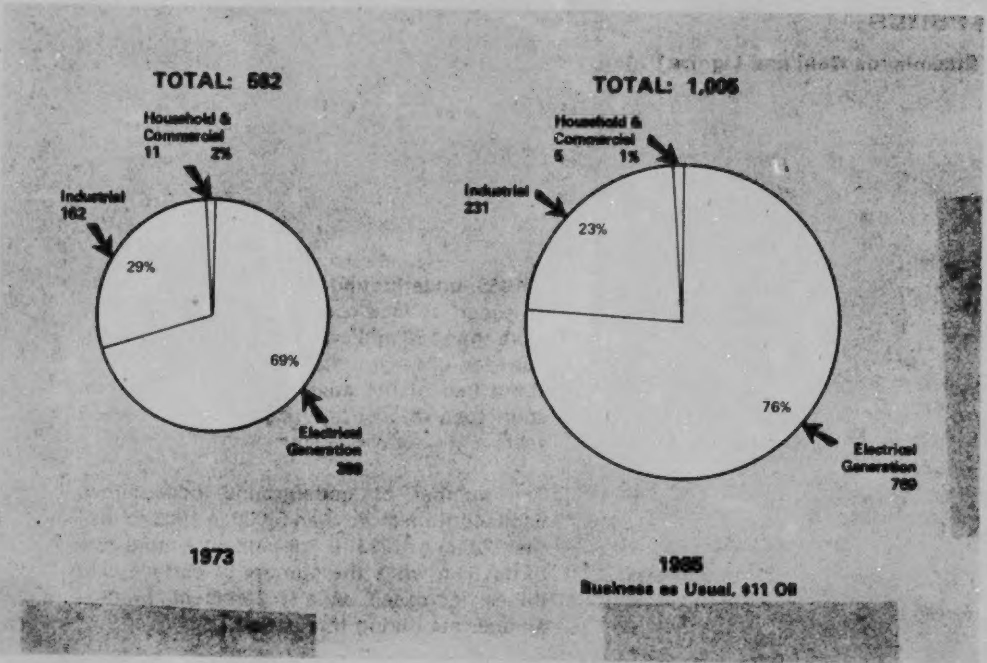
[1] All coal mines that produced 1,000 tons of coal during the year.

UNITED STATES CONSUMPTION

(Source 17)

U.S. Coal Consumption, by Sector, 1973 and 1985

(Million Short Tons)



(Source 3)

Consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States

(In thousand short tons)

Year and month	Electric power utilities 1/	Bunker lake vessel and foreign 2/	Manufacturing and mining industries: Beehive coke plants	Oven coke plants	Steel and rolling mills 3/	Other manufacturing and mining industries 4/	Retail deliveries to other consumers 5/	Total of classes shown
1969	308,461	313	1,158	91,763	5,360	85,376	16,666	507,275
1970	318,921	298	1,428	96,581	5,410	[illegible]	12,072	515,619
1971	326,280	207	1,278	81,531	5,560	68,655	11,351	494,862
1972 6/:								
January	30,074	1	82	6,790	510	5,190	1,304	43,951
February	28,790	---	86	6,689	560	6,075	990	43,170
March	28,261	2	85	7,373	692	6,817	763	43,773
April	25,908	11	85	7,338	416	5,998	602	40,158
May	26,668	20	82	7,557	378	5,580	323	40,588
June	27,600	23	84	7,126	244	5,166	262	40,505
July	30,088	18	79	7,276	290	4,970	350	43,071
August	31,470	24	87	7,273	290	6,969	577	44,690
September	28,800	20	88	6,952	306	6,996	840	42,002
October	28,967	17	87	7,258	301	5,438	902	43,050
November	29,720	19	102	7,063	457	5,772	971	44,104
December	32,786	8	112	7,518	538	6,160	1,076	47,698
Total	348,612	163	1,059	86,213	6,050	67,131	8,768	516,776
1973 6/:								
January	36,175	---	107	7,718	696	6,029	1,158	49,838
February	30,625	---	99	7,083	577	5,340	928	44,652
March	30,533	2	103	7,047	560	5,106	683	44,815
April	28,868	13	102	7,625	525	5,100	396	42,609
May	29,655	17	106	7,963	550	4,997	360	43,028
June	31,824	15	96	7,678	558	4,563	381	45,115
July	34,620	13	101	7,063	450	6,237	431	47,715
August	35,933	14	113	7,701	625	4,128	466	48,860
September	32,735	12	105	7,698	638	4,019	672	45,471
October	32,263	12	132	7,755	610	5,051	884	46,427
November	31,962	11	124	7,612	575	5,487	932	46,703
December	33,886	7	127	7,921	660	6,520	1,089	50,138
Total	386,879	136	1,310	92,324	6,356	60,837	8,208	556,822

1/ Federal Power Commission.
2/ Bureau of the Census, U.S. Department of Commerce, Ore and Coal Exchange.
3/ Estimates based upon reports collected from a selected list of representative steel and rolling mills.
4/ Estimates based upon reports collected from a selected list of representative manufacturing plants.
5/ Estimates based upon reports collected from a selected list of representative retailers. Includes some coal shipped by truck from mine to final destination.
6/ Preliminary.

SHIPPING

(Source 3)

Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, in 1973, as reported by mine operators

(Thousand short tons)

Route	State	By State	Total for route
RAILROAD			
Alaska	Alaska	579	579
Atchison, Topeka & Santa Fe	Illinois	45	1,436
	New Mexico	1,391	
Baltimore & Ohio	Illinois	1,099	24,561
	Maryland	169	
	Ohio	6,172	
	Pennsylvania	3,000	
	West Virginia	14,121	
Bevier & Southern	Missouri	720	720
Bessemer & Lake Erie	Pennsylvania	2,522	2,522
Burlington Northern	Illinois	8,801	23,884
	Iowa	89	
	Missouri	72	
	Montana (Bit. and Lig.)	10,667	
	North Dakota (Lig.)	2,877	
	Wyoming	1,378	
Cambria & Indiana	Pennsylvania	3,274	3,274
Carbon County	Utah	2,407	2,407
Chesapeake & Ohio	Kentucky	28,979	60,898
	Ohio	994	
	West Virginia	30,925	
Chicago & Eastern Illinois	Illinois	2,907	2,907
Chicago & Illinois Midland	Illinois	1,161	1,161
Chicago, Milwaukee, St. Paul and Pacific	Indiana	3,455	3,607
	Montana (Bit. and Lig.)	5	
	North Dakota (Lig.)	147	
Chicago & North Western	Illinois	3,827	3,827
Chicago, Rock Island & Pacific	Iowa	46	46
Clinchfield	Kentucky	371	5,617
	Virginia	5,246	
Colorado & Wyoming	Colorado	624	624
Denver & Rio Grande Western	Colorado	4,021	4,769
	Utah	748	
Erie-Lackawanna	Ohio	94	94
Gulf, Mobile & Ohio	Illinois	2,986	2,986
Illinois Central	Illinois	22,025	34,055
	Kentucky	12,030	
Interstate	Virginia	3,196	3,196
Kansas City Southern	Oklahoma	190	190
Kentucky & Tennessee	Kentucky	443	443
Lake Erie, Franklin & Clarion	Pennsylvania	121	121
Louisville & Nashville	Alabama	3,572	42,234
	Indiana	3,805	
	Kentucky	33,706	
	Tennessee	1,081	
	Virginia	70	
Mary Lee	Alabama	726	726
Missouri Illinois	Illinois	2,209	2,209
Missouri-Kansas-Texas	Kansas	712	1,181
	Missouri	468	
	Oklahoma	1	
Missouri Pacific	Arkansas	260	4,566
	Illinois	4,128	
	Oklahoma	178	
Monongahela	West Virginia	6,899	6,899
Montour	Pennsylvania	2,721	2,721
Norfolk & Western	Iowa	28	67,220
	Kentucky	14,516	
	Ohio	5,493	
	Virginia	18,957	
	West Virginia	28,226	
Penn Central (includes coal shipped over Kanawha & Michigan, Kelley's Creek, Toledo & Ohio Central and Zanesville & Western)	Illinois	2,342	45,273
	Indiana	7,686	
	Ohio	9,577	
	Pennsylvania	19,331	
	West Virginia	6,337	
Pittsburgh & Shawmut	Pennsylvania	2,170	2,170
St. Louis-San Francisco	Alabama	253	2,193
	Arkansas	9	
	Kansas	297	
	Oklahoma	1,634	

continued on page 134

(Source 3)

Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, in 1973, as reported by mine operators - continued

(Thousand short tons)

Route	State	By State	Total for route
RAILROAD--Continued			
Soo Line	North Dakota (Lig.)	681	681
Southern	Alabama	4,587	16,719
	Indiana	2,305	
	Kentucky	730	
	Tennessee	3,889	
	Virginia	5,205	
Tennessee	Tennessee	58	58
Tennessee Coal, Iron & Railroad Co.	Alabama	1,576	1,576
Union Pacific	Colorado	208	7,930
	Wyoming	7,722	
Utah	Utah	847	847
Western Maryland	Maryland	1,086	5,262
	Pennsylvania	1,055	
	West Virginia	3,11[illegible]	
Woodward Iron Company	Alabama	842	842
Yankeetown	Indiana	1,961	1,961
Total railroad shipments 1/		397,158	397,158
WATERWAY			
Allegheny River	Pennsylvania	710	710
Arkansas River	Arkansas	165	222
	Oklahoma	57	
Big Sandy River	Kentucky	109	109
Black Warrior River	Alabama	2,743	2,743
Cumberland River	Kentucky	63	63
Green River	Kentucky	14,018	14,018
Illinois River	Illinois	291	291
Kanawha River	West Virginia	3,764	3,764
Monongahela River	Pennsylvania	16,257	24,488
	West Virginia	8,231	
Ohio River	Illinois	1,868	21,613
	Indiana	1,917	
	Kentucky	7,680	
	Ohio	6,539	
	Pennsylvania	59	
	West Virginia	3,550	
Tennessee River	Alabama	10	583
	Tennessee	573	
Total waterway shipments 1/		68,606	68,606
Total loaded at mines for shipment by railroads and waterways		465,762	465,762
Shipped by truck from mine to final destination		57,268	57,268
Coal transported to electric utility plants adjacent to or near the mine		64,424	64,424
All other 2/		6,284	6,284
Total production 1/		593,738	593,738

1/ Data may not add to totals shown because of independent rounding.

2/ Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and shipped by slurry pipeline.

(Source 3)

Bituminous coal and lignite shipped by unit train in the United States

(Thousand short tons)

State	1972	1973
Alabama	4,253	3,930
Colorado	1,210	2,391
Illinois	21,777	22,155
Indiana	3,048	5,493
Iowa	378	---
Kansas	214	190
Kentucky:		
Eastern	9,522	12,197
Western	6,706	7,292
Total 1/	16,228	19,489
Maryland	60	122
Montana (bituminous)	7,698	10,115
New Mexico	623	778
North Dakota (lignite)	1,577	1,607
Ohio	18,063	18,266
Oklahoma	462	489
Pennsylvania	18,228	22,262
Tennessee	1,171	1,208
Utah	1,905	2,094
Virginia	3,301	4,477
West Virginia	33,449	34,203
Wyoming	2,889	5,826
Total 1/	136,534	155,093

1/ Data may not add to totals shown because of independent rounding.

(Source 3)

Distribution of bituminous coal and lignite, in 1973, by method of movement and consumer use

(Thousand short tons)

Shipments	Electric utilities	Coke and gas plants	Retail dealers	All others	Railroad fuel	Used at mines and sales to employees
Total shipments to all destinations in the United States, Canada, and Mexico, by all methods of movements and consumer use, and overseas exports	382,164	97,995	8,015	1/65,080	229	1,600
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Method of movement:						
All-rail	195,008	54,285	4,631	1/36,329	-----	-----
River and ex-river	76,490	23,203	277	4,709	-----	-----
Great Lakes 2/	17,628	13,767	975	6,478	-----	-----
Tidewater 3/	2,357	4,955	-----	43	-----	-----
Truck	48,397	1,724	2,337	15,661	-----	-----
Tramway, conveyor, and private railroad	42,284	61	-----	1,860	-----	-----
Method of movement and/or consumer uses unknown	-----	-----	-----	-----	229	1,600
Total	382,164	97,995	8,015	4/65,080	229	1,600

Shipments	Canadian Great Lakes commercial docks 4/	U.S. Great Lakes dock storage 4/	U.S. tidewater dock storage 4/	Overseas exports 5/ 6/	Net change in mine inventory	Total
Total shipments to all destinations in the United States, Canada, and Mexico, by all methods of movements and consumer use, and overseas exports	174	-117	-----	35,570	-922	589,788
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Method of movement:						
All-rail	-----	-----	-----	-----	-----	1/290,053
River and ex-river	-----	-----	-----	-----	-----	104,679
Great Lakes 2/	-----	-----	-----	-----	-----	38,848
Tidewater 3/	-----	-----	-----	-----	-----	7,355
Truck	-----	-----	-----	-----	-----	68,114
Tramway, conveyor, and private railroad	-----	-----	-----	-----	-----	44,205
Method of movement and/or consumer uses unknown	174	-117	-----	35,570	-922	36,526
Total	174	-117	-----	35,570	-922	589,778

1/ Includes overseas exports from producing districts 13 and 14.

2/ Excludes shipments to Canadian Great Lakes commercial docks and U.S. dock storage for which consumer uses are not available; however, includes vessel fuel, the destinations of which are not available.

3/ Excludes overseas exports for which consumer uses are not available.

4/ Consumer use unknown.

5/ Excludes Canada; consumer use unknown.

6/ Excludes overseas exports from producing districts 13 and 14.

(Source 3)

Total bituminous coal and lignite shipments and percent of grand total shipments, by geographic division and State of destination

Geographic division and State of destination	Thousand short tons					Percent of total				
	1969	1970	1971	1972	1973	1969	1970	1971	1972	1973
Total	[illegible]	597,042	511,123	595,226	589,706	100.0	100.0	100.0	100.0	100.0
New England	5,651	1,965	2,445	1,509	1,333	1.0	.6	.4	.2	.2
Massachusetts	2,205	640	297	137	106	.4	.1	1/	1/	1/
Connecticut	2,299	1,513	1,071	194	118	.4	.3	.2	1/	1/
Maine, New Hampshire, Vermont, and Rhode Island	1,137	1,129	877	1,206	1,109	.2	.2	.3	.2	.2
Middle Atlantic	99,695	80,892	77,552	75,968	80,283	16.9	15.2	14.5	13.0	13.6
New York	26,126	21,232	15,596	13,177	13,290	4.3	3.4	2.8	[illegible]	2.3
New Jersey	[illegible]	5,921	2,979	1,873	2,524	1.0	.8	.5	.2	.4
Pennsylvania	67,061	51,399	58,987	66,518	64,469	10.7	14.9	10.2	10.8	10.9
East North Central	196,502	189,011	187,469	209,506	195,503	35.0	36.5	36.2	36.7	33.2
Ohio	67,156	62,575	53,116	57,798	65,557	[illegible]	15.1	[illegible]	[illegible]	11.1
Indiana	[illegible]	43,855	45,599	46,618	65,001	7.4	7.1	7.0	[illegible]	[illegible]
Illinois	45,541	42,331	38,090	42,028	40,928	8.1	7.1	6.9	[illegible]	6.9
Michigan	35,875	36,617	32,605	35,083	31,049	6.3	6.1	5.4	[illegible]	5.4
Wisconsin	16,072	17,109	15,960	14,978	12,836	2.7	2.9	2.8	[illegible]	2.2
West North Central	35,533	35,398	37,427	39,587	42,778	5.9	5.9	6.5	[illegible]	7.3
Minnesota	9,250	8,894	8,313	8,692	9,163	1.6	1.5	1.4	[illegible]	1.6
Iowa	6,073	6,299	6,195	6,956	[illegible]	[illegible]	1.0	1.4	[illegible]	1.2
Missouri	13,508	13,397	13,958	15,813	17,385	2.0	2.3	2.4	[illegible]	2.9
North Dakota and South Dakota	3,778	4,700	5,272	5,536	5,816	.5	.8	.9	[illegible]	1.0
Nebraska and Kansas	1,571	1,774	2,825	2,567	3,527	.3	.3	.5	[illegible]	.6
South Atlantic	95,974	91,590	80,154	90,977	95,072	16.0	15.3	[illegible]	[illegible]	16.1
Delaware and Maryland	15,008	13,369	11,599	9,744	10,596	2.7	[illegible]	2.1	[illegible]	1.8
District of Columbia	1,135	1,111	538	562	348	.2	.2	.1	[illegible]	.1
Virginia	12,866	11,685	4,358	8,509	7,910	2.1	[illegible]	1.7	[illegible]	1.3
West Virginia	26,356	26,332	26,608	32,454	32,305	4.4	4.1	[illegible]	[illegible]	5.5
North Carolina	18,711	21,598	19,775	21,489	19,820	3.3	3.6	3.6	[illegible]	3.3
South Carolina	5,924	6,143	6,329	6,015	6,909	1.0	1.0	1.1	[illegible]	1.2
Georgia and Florida	11,951	13,219	16,095	17,015	16,896	2.1	[illegible]	[illegible]	[illegible]	2.9
East South Central	62,790	69,105	72,131	78,863	75,011	11.2	11.6	[illegible]	[illegible]	12.7
Kentucky	20,955	23,673	25,540	27,894	25,078	3.8	4.0	[illegible]	[illegible]	4.2
Tennessee	16,743	18,315	19,977	21,930	22,238	3.0	3.1	3.4	[illegible]	3.8
Alabama and Mississippi	25,580	27,190	27,094	30,794	27,695	4.6	4.5	[illegible]	[illegible]	4.7
West South Central: Arkansas, Louisiana, Oklahoma, and Texas	925	2,144	887	930	8,049	.2	.3	.2	[illegible]	1.4
Mountain	20,418	25,232	21,591	26,330	29,836	[illegible]	[illegible]	[illegible]	[illegible]	5.1
Colorado	4,687	5,139	4,475	5,516	6,600	.8	.9	.8	[illegible]	1.1
Utah	2,975	3,010	2,941	3,957	3,957	.6	.5	.5	[illegible]	.7
Montana and Idaho	1,065	1,085	1,348	1,381	1,395	.3	.2	.2	[illegible]	.2
Wyoming	3,524	3,665	3,738	5,153	6,200	.6	.6	.7	[illegible]	1.1
New Mexico	3,861	6,032	6,715	6,951	7,363	.6	[illegible]	[illegible]	[illegible]	1.2
Arizona and Nevada	1,104	1,150	2,124	4,512	4,631	.2	.2	.4	.8	.8
Pacific	2,629	2,471	3,504	4,648	5,908	.4	.4	.6	[illegible]	1.0
Washington and Oregon	952	354	2,453	2,805	3,510	.1	.1	.4	[illegible]	.6
California	2,132	2,117	1,961	1,760	2,398	.4	.4	.3	[illegible]	.4
Alaska	433	412	748	785	707	.1	.1	.1	[illegible]	.1
Canada 2/	16,752	18,673	17,510	18,262	16,232	[illegible]	[illegible]	[illegible]	[illegible]	2.7
Mexico	96	183	291	464	505	1/	1/	[illegible]	[illegible]	.1
Coal destination not revealable	3,175	3/ [illegible]	4/ [illegible]	5/ 1,750	6/ 1,735	[illegible]	3/ [illegible]	4/ [illegible]	5/ [illegible]	6/ .3
U.S. railroad fuel	507	701	509	357	226	.1	.1	.1	.1	1/
U.S. Great Lakes storage	-466	-16	-263	-166	-117	-.1	-1/	-1/	-1/	-1/
U.S. tidewater dock storage	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Vessel fuel	961	1,072	713	598	600	.2	.2	.1	.1	.1
Bunker fuel	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Overseas exports	49,961	7/ [illegible]	8/ 47,510	9/ 46,507	10/ 35,570	[illegible]	7/ [illegible]	8/ [illegible]	9/ [illegible]	10/ 6.0
Coal used at mines and sales to employees	1,990	1,486	1,453	1,571	1,600	.3	[illegible]	.3	[illegible]	.3
Change in mine inventory	960	62	977	1,097	-922	.2	1/	.2	[illegible]	-.2

1/ Less than 0.1 percent.
2/ Includes shipments to Canadian Great Lakes commercial docks and railroad companies.
3/ Includes overseas exports from producing districts 13 and 17.
4/ Includes overseas exports from producing districts 13, 14, 17, and 20.
5/ Includes overseas exports from producing districts 13, 14, and 20.
6/ Includes overseas exports from producing districts 13 and 14.
7/ Excludes overseas exports from producing districts 13 and 17.
8/ Excludes overseas exports from producing districts 13, 14, 17, and 20.
9/ Excludes overseas exports from producing districts 13, 14, and 20.
10/ Excludes overseas exports from producing districts 13 and 14.

(Source 3)

Shipments of bituminous coal and lignite by average sulfur content by consumer use in 1973

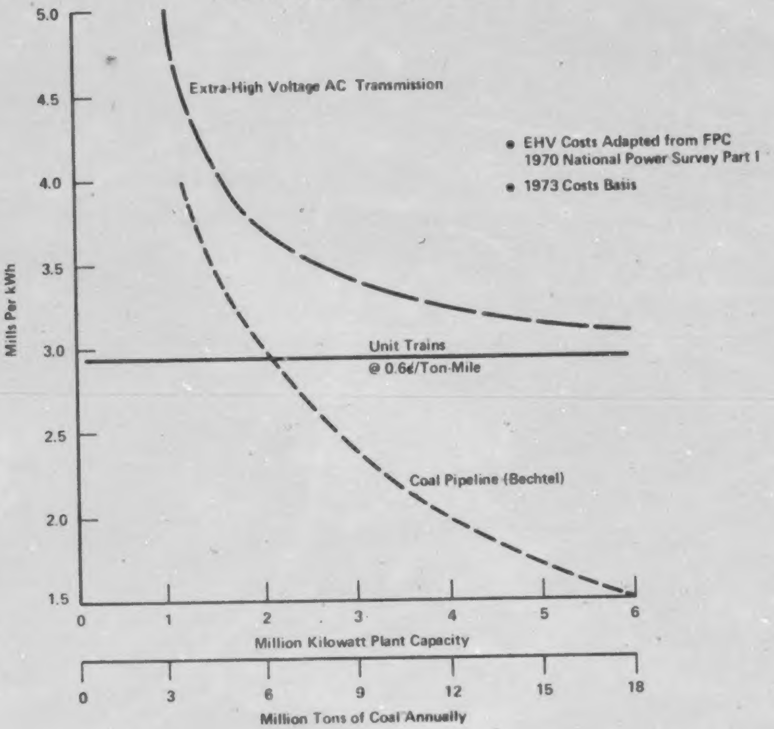
District	Quantity shipped (thousand short tons)						Average sulfur content (percent)					
	Electric utilities	Coke and gas plants	Other industrial uses and retail dealers	All other uses	Exports (overseas and Canada)	Total 1/	Electric utilities	Coke and gas plants	Other industrial uses and retail dealers	All other uses	Exports (overseas and Canada)	Total
1. Eastern Pennsylvania ---	24,075	4,2[illegible]	2,547	2,615	1,726	35,261	2.2	1.0	1.9	1.8	1.6	2.0
2. Western Pennsylvania ---	5,501	12,480	3,116	2,194	640	23,931	2.1	1.5	1.8	1.6	2.1	1.7
3. Northern West Virginia -	16,860	1,895	1,656	579	4,239	25,229	2.8	1.2	2.5	2.0	2.1	2.5
4. Ohio ----------------	28,508	---	5,866	647	1	35,022	3.5	---	2.6	3.2	2.9	3.4
5. Michigan ------------	---	---	---	---	---	---	---	---	---	---	---	---
6. Panhandle -----------	6,728	---	231	123	27	7,109	3.9	---	3.0	2.8	2.8	3.8
7. Southern Numbered 1 ----	734	7,376	772	1,260	5,904	16,046	.6	.7	.8	.8	.7	.7
8. Southern Numbered 2 ----	25,134	19,147	4,657	5,446	6,590	60,974	1.2	.8	.8	.9	.7	1.0
9. West Kentucky ---------	36,188	---	1,436	157	---	37,781	4.1	---	3.9	4.9	---	4.1
10. Illinois ------------	35,833	3,090	7,035	113	---	46,071	3.5	.8	2.9	2.8	---	3.2
11. Indiana -------------	15,893	---	3,902	171	---	19,966	3.4	---	3.4	3.4	---	3.4
12. Iowa ----------------	564	---	---	6	---	570	3.5	---	---	4.0	---	3.5
13. Southeastern ---------	8,027	4,616	455	598	569	14,265	1.6	1.0	2.3	.7	1.4	1.4
14. Arkansas-Oklahoma ------	---	203	242	---	132	577	---	1.7	1.8	---	.6	1.5
15. Southwestern ---------	6,893	58	195	32	---	7,178	5.1	.5	3.8	1.2	---	5.0
16. Northern Colorado ------	493	---	---	16	---	509	.5	---	---	.3	---	.[illegible]
17. Southern Colorado ------	3,025	1,890	277	65	---	5,257	.6	.6	.6	.5	---	.6
18. New Mexico -----------	11,374	---	10	3	---	11,387	.5	---	.5	.5	---	.5
19. Wyoming -------------	8,204	2	639	32	---	8,877	.5	.7	.7	.5	---	.5
20. Utah ---------------	1,747	1,286	1,323	158	---	4,514	.5	.8	.6	.5	---	.7
21. North-South Dakota -----	5,975	---	774	34	1	6,784	.7	---	.8	1.0	1.5	.7
22. Montana -------------	6,384	---	16	13	---	6,413	.6	---	.9	.6	---	.6
23. Washington ----------	680	---	---	14	---	694	2.0	---	---	[illegible].0	---	[illegible].0
Total United States --	248,820	56,341	35,149	14,276	19,829	374,415	2.7	1.0	2.2	1.4	1.1	2.3

1/ Total shipments by producers reporting sulfur content (63 percent of total U.S. production).

(Source 17)

U.S. Coal Transportation Costs, By Mode

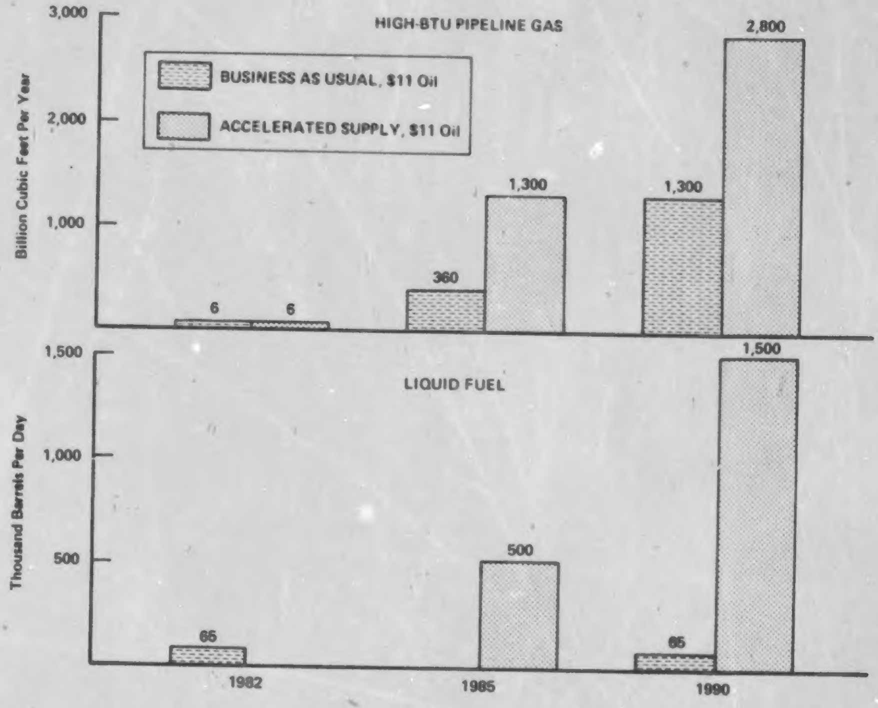
(For a 1,000-Mile Transport Distance)



SYNTHETIC FUELS

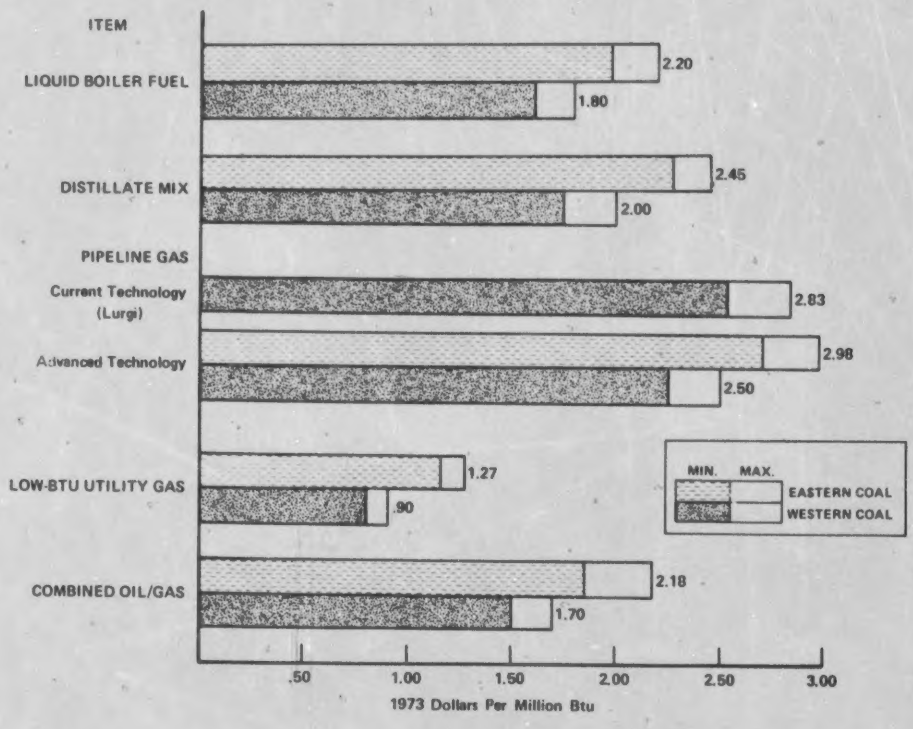
(Source 17)

Projected Production of Synthetic Fuels from Coal



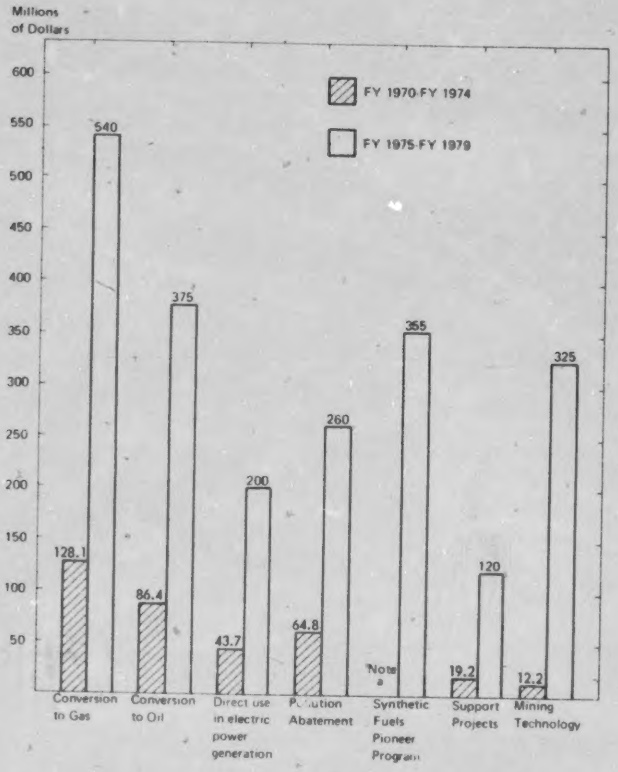
(Source 17)

Costs of Synthetic Fuels from Coal, 1973



(Source 36)

COMPARISON OF ESTIMATED FEDERAL FUNDING FOR SELECTED COAL RESEARCH ACTIVITIES – FISCAL YEARS 1970 – 1974 AND FISCAL YEARS 1975 – 1979



Note a – A new program which was not specifically funded in FY 1970-1974 period.

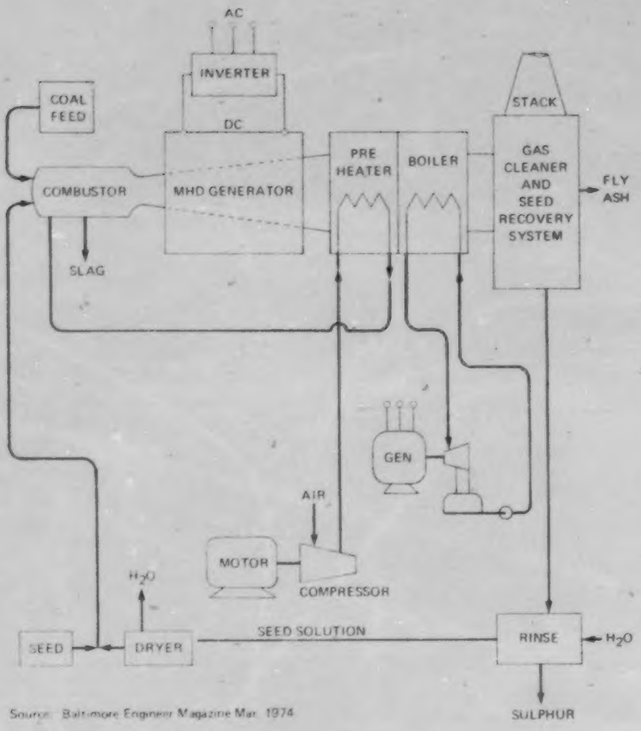
Summary of Advanced Fluidized Bed Processes

Process name	Federal agency sponsor	Industry cosponsor	Contractor	Estimated funding to 6-30-74 (millions) Federal	Industry	Total	Process phase Description	Estimated completion date	Estimated total cost (millions)
Multicell Fluidized Bed Boiler	OCR	None	Pope, Evans, & Robbins	$5.8	None	$5.8	Pilot plant under construction expected to be operational in fiscal year 1975	1976	$12.0
Fluidized Bed Combustion	EPA	Exxon Corp.	Same as cosponsor	1.2	.3	1.5	Pilot plant in operation	1977	5.4

(Source 36)

(Source 36)

MHD CONVERSION PROCESS


AC
INVERTER
DC
COAL FEED
COMBUSTOR
MHD GENERATOR
SLAG
PRE HEATER
BOILER
STACK
GAS CLEANER AND SEED RECOVERY SYSTEM
FLY ASH
GEN
AIR
MOTOR
COMPRESSOR
H_2O
SEED
DRYER
SEED SOLUTION
RINSE
H_2O
SULPHUR

Source: Baltimore Engineer Magazine Mar. 1974

LEGEND:

H_2O — water
H_2 hydrogen
GEN – generator
DC – direct current
AC – alternating current

(Source 36)

Summary of Advanced Magnetohydrodynamics Projects

Project name	Federal agency sponsor	Industry cosponsor	Contractor	Estimated funding to 6-30-74			Process phase		Estimated total cost (millions)
				Federal	Other	Total	Description	Estimated completion date	
				(millions)					
MHD Direct Energy Conversion	OCR/TVA	University of Tennessee Space Institute	Same as cosponsor	$1.2	$0.2	$1.4	Develop basic aspects of MHD for direct combustion of coal	1974	$1.4
MHD Power Generation	OCR	AVCO	Same as cosponsor	3.1	2.5	5.6	Conduct MHD generator tests	1974	5.6
Clean Power Generation from coal	OCR	Westinghouse Electric Corp.	Same as cosponsor	1.0	0	1.0	Study material problems and associated MHD concepts	1975	5.7
Three-stage combustion for MHD Power Generation	OCR/BOM	None	BOM	1.2	None	1.2	Construct a small high-temperature combustion unit	1975	2.3

(Source 36)

Summary of Advanced Liquid Conversion Processes

Process name	Federal agency sponsor	Industry cosponsor	Contractor	Estimated funding to 6-30-74 (millions)			Process phase		Estimated total cost (millions)
				Federal	Other	Total	Description	Estimated completion date	
Char-Oil Energy Development (COED)	OCR	None	FMC Corporation	$ 9.0	NONE	$9.0	Pilot plant in operation	1974	$21.4
Solvent Refined Coal (SRC)	OCR	None	Pittsburg & Midway Coal Mining Company	28.2	NONE	28.2	Pilot plant scheduled for preliminary testing in 1974	1976	29.7
Multi-process Plant (formerly Project Gasoline)	OCR	Fluor Corp., Allegheny Power and American Electric Power Company	Fluor Corporation	11.3	2.2	13.5	Pilot plant operated 1967-70 under Project Gasoline. Scheduled to be reactivated in 1975 as a component and process test facility	1979	13.0
H-Coal	OCR	Five cosponsors	Hydrocarbon Research, Inc.	5.4	.3	5.7	Design and construction of pilot plant	1979	75.0
Synthoil	BOM/OCR	(a)	BOM Pittsburgh Energy Research Center	2.3	NONE	2.3	Large laboratory model being developed	1976	4.5

[a] As of November 1974 a contract was being negotiated for cosponsorship of this process.

(Source 36)

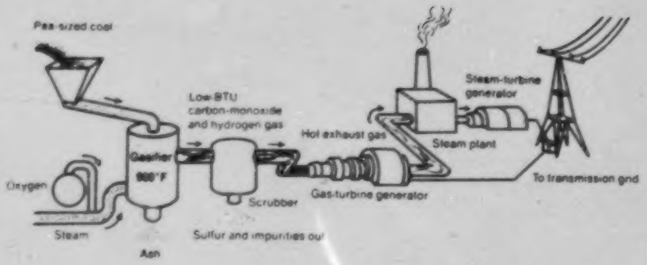
Summary of Low-Btu Processes

Process name	Federal agency sponsor	Industry cosponsor	Contractor	Estimated funding to 6-30-74			Process phase		Total estimated cost
				Federal	Other	Total	Description	Estimated completion date	
				(millions)					(millions)
Stirred Fixed Bed Gas Producer	OCR BOM TVA	To be selected	BOM Research Center, Morgantown, W.Va.	$3.7	None	$3.7	Process development unit in operation	1981	$32.0
Entrained Bed Gasifier	OCR	Foster, Wheeler, Corp; Pittsburg & Midway Coal Mining Co., and Northern States Power Co.	Same as cosponsors	.5	None	.5	Contract investigation to be completed in 1978	1978	69.0
Entrained Bed Atmospheric Gasification System	OCR	Combustion Engineering, Inc. Consolidated, Edison of New York	Same as cosponsors	.15	.15	.3	Contract under negotiation for the design, construction, and operation of a process development unit	(a)	27.2
Fluidized Bed Pressure Gasification System	OCR	Westinghouse Electric Corp.; Public Service of Indiana. Amax Coal Co.; Bechtel Corp.; and Peabody Coal Co.	Same as cosponsors	5.7	2.5	8.2	Process development unit is being tested	1981	25.0
High Temperature Gas Clean-up Using Dolomite	OCR	None	Air Products and Chemicals, Inc.	.5	None	.5	Laboratory experiments continuing	1975	.5
High-Temperature Cleanup with molten salt	OCR	None	Battelle Memorial Institute Pacific Northwest Laboratories	.4	None	.4	Design of a pilot plant in progress	1974	4.0

[a] Contract under negotiation as of Aug. 15, 1974. Estimated total cost fur current phase not available.

(Source 36)

LOW-BTU GAS FOR ELECTRIC POWER GENERATION

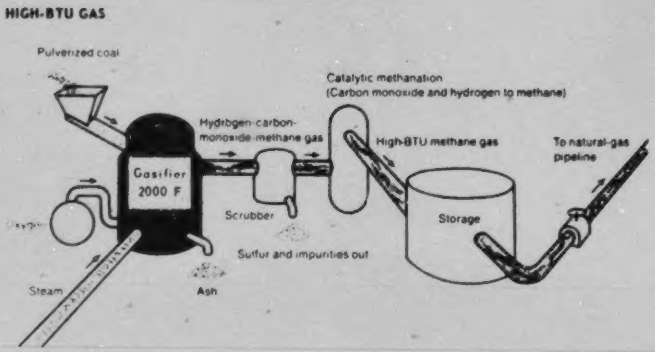

Pea-sized coal
Low-BTU carbon-monoxide and hydrogen gas
Gasifier
900°F
Oxygen
Steam
Ash
Scrubber
Sulfur and impurities out
Hot exhaust gas
Gas-turbine generator
Steam plant
Steam-turbine generator
To transmission grid

(Source 36)

Summary of Advanced High-Btu Processes

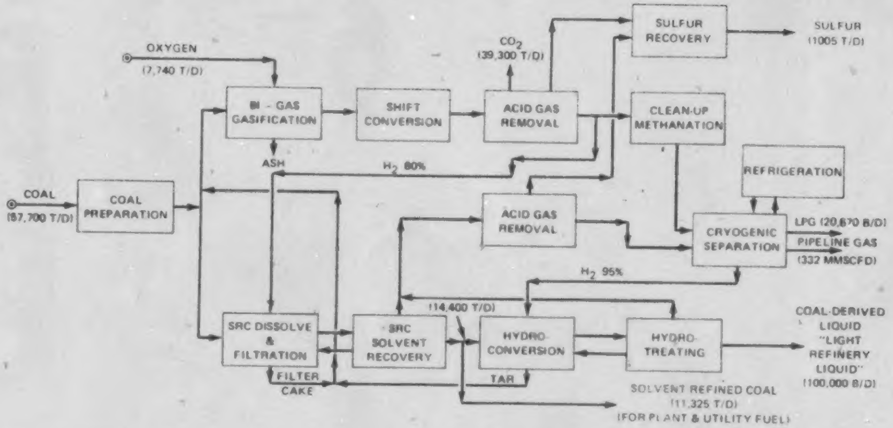
Process name	Federal agency sponsor	Industry cosponsor	Contractor	Estimated funding to 6-30-74 Federal (millions)	Estimated funding to 6-30-74 Other (millions)	Estimated funding to 6-30-74 Total (millions)	Process phase Description	Process phase Estimated completion date	Estimated total cost (millions)
HYGAS	OCR	AGA	Institute of Gas Technology	$ 9.8	$6.7	$16.5	Pilot plant in operation	1976	$63.5
BI-GAS	OCR	AGA	Bituminous Coal Research, Inc.	18.1	7.1	25.2	Pilot plant under construction; scheduled for completion in early 1975	1977	45.0
CO_2 ACCEPTOR	OCR	AGA	Consolidation Coal Company	20.7	5.6	26.3	Pilot plant in operation	1976	31.5
SYNTHANE	BOM	None	Rust Engineering	19.1	-	19.1	Pilot plant under construction; scheduled for completion in late 1974	1975	21.7

(Source 36)


HIGH-BTU GAS
Pulverized coal
Catalytic methanation
(Carbon monoxide and hydrogen to methane)
Hydrogen-carbon-
monoxide-methane gas
High-BTU methane gas
To natural-gas
pipeline
Gasifier
2000 F
Oxygen
Scrubber
Storage
Sulfur and impurities out
Steam
Ash

(Source 36)

COAL-OIL-GAS (COG) REFINING PROCESS


OXYGEN
(7,740 T/D)
COAL
(87,700 T/D)
COAL PREPARATION
BI - GAS GASIFICATION
ASH
SHIFT CONVERSION
CO_2
(39,300 T/D)
ACID GAS REMOVAL
SULFUR RECOVERY
SULFUR
(1005 T/D)
CLEAN-UP METHANATION
REFRIGERATION
H_2 80%
ACID GAS REMOVAL
CRYOGENIC SEPARATION
LPG (20,670 B/D)
PIPELINE GAS
(332 MMSCFD)
H_2 95%
(14,400 T/D)
SRC DISSOLVE & FILTRATION
FILTER CAKE
SRC SOLVENT RECOVERY
HYDRO-CONVERSION
TAR
HYDRO-TREATING
COAL-DERIVED LIQUID "LIGHT REFINERY LIQUID"
(100,000 B/D)
SOLVENT REFINED COAL
(11,325 T/D)
(FOR PLANT & UTILITY FUEL)

Source: Chemical Engineering Progress March 1973 p. 62.

LEGEND:

T/D – tons per day
B/D – barrels per day
H_2 – hydrogen
CO_2 – carbon dioxide
LPG – liquified petroleum gas (propane, butane)
MMSCFD – million standard cubic feet per day

(Source 41)

TYPICAL COST ESTIMATES AND CONVERSION EFFICIENCIES FOR PRODUCING SYNTHETIC FUELS FROM COAL

Synthetic Fuel	Mid-1973 Price Range (after by-product credits), $/million Btu	Approximate Conversion Efficiency (including credits for burnable by-products), percent
Low-Btu Gas	1.00-1.50	70-80
High-Btu Gas	1.50-2.50	65-70
Typical Low-Sulfur Heavy Fuel oil-Naphtha Mix	1.50-2.50	65-70
Typical Gasoline-Distillate Fuel Oil Mix	2.00-3.00	65-70
Methyl Alcohol	3.00-4.00	40-45

(Source 41)

ANNOUNCED COMMERCIAL AND DEMONSTRATION COAL GASIFICATION PLANTS
(As of February 20, 1975)

Controlling Company(s)*	Site	Process	Coal Feed, tons/day	Plant Output, million CF/day	Status
A. HIGH-Btu GAS PROJECTS					
El Paso Natural Gas Co.	Four Corners Area, New Mexico	Lurgi gasification with methanation	28,250	288	El Paso Natural Gas Co. plans to construct and operate the Burnham Coal Gasification Complex on the Navajo Indian Reservation.
Texas Eastern Transmission Corp. and Pacific Lighting Corp. (Utah International Corp.)	Four Corners Area, New Mexico	Lurgi gasification with methanation	102,500	1000 (4 plants)	The firms plan to construct and operate four plants on the Navajo Indian Reservation near Farmington, N.M. Utah International will supply the coal and water.
Panhandle Eastern Pipe Line Co. (Peabody Coal Co.)	Eastern Wyoming	Lurgi gasification with methanation	25,000	270	Plant operation is anticipated in the 1978 1980 period, assuming timely receipt of all required governmental authorizations.
Natural Gas Pipeline Co. of America	Dunn County, North Dakota	Lurgi gasification with methanation	108,500 (4 mines)	1000 (4 plants)	The company plans to build at least four and possibly eight gasification plants. Coal will be mined from 110,000 acres of leases in North Dakota. The first plant is scheduled to go on-line in 1982.
American Natural Gas Co. (North American Coal Corp.)	Beulah-Hazen Area, North Dakota	—	—	1000 (4 plants)	Construction of the initial plant is tentatively scheduled to start in 1977, with gas production in 1981.
Northern Natural Gas Co., Cities Service Gas Co.	Powder River Basin, Montana	—	—	1000 (4 plants)	Northern Natural and Cities Service plan to construct four 250 million CF/d coal gasification plants. Peabody Coal has agreed to supply about 500 millio tons of coal, and the gas companies are negotiating for another like amount. Through 1975, $10-$11 million will be spent for preliminary development. Construction of the first plant could start in 1976 1977 with operation in 1979 1980.
Texas Gas Transmission Corp. (Consolidation Coal Co.)	Western Kentucky	—	—	80	Texas Gas Transmission and the State of Kentucky have signed an agreement to build an 80 million CF/day gasification plant expandable to 250 million CF/day. A Federal Government commitment to fund a portion of capital and operating costs is being sought and is an essential condition for construction.

*Mining partners in parentheses.

Note: Recent capital cost estimates are not available for most of the announced plants. American Natural Gas Co. estimates its first plant and associated mine will cost about $1 billion.

Source: *Gas Supply Review*

(Source 41)

ESTIMATED INCREMENTAL COST OF HEATING USING GAS AND ELECTRICITY FROM COAL

Estimated Cost of Electric Heat From Coal	
Capital Cost	$456/kW
Annual Capital Cost at 20%	$91.2/kW
Fixed Charge Rate at 65% Load Factor	1.602 cents/kWhr
Fuel Cost at $1.00/Million Btu	0.90 cents/kWhr
Operation and Administration Cost	0.15 cents/kWhr
Generation Cost at Bus Bar	2.65 cents/kWhr
Cost of Service to Residential Customers	1.28 cents/kWhr
Total Cost of Electric Heat	3.93 cents/kWhr
Total Cost of Electric Heat	$11.52/million Btu
Estimated Cost of Gas Heat From Coal	
Capital Cost (288 Million CF/Day)	$540 million
Annual Capital Cost at 20%	$108 million
Fixed Costs	$1.197/million Btu
Fuel Cost (at 56% Efficiency)	$0.89/million Btu
Operating Cost	$0.075/million Btu
Total Production Cost	$2.16/million Btu
Transmission Cost	$0.30/million Btu
City Gate Price	$2.46/million Btu
Distribution Cost to Residential User	$1.05/million Btu
Residential Gas Cost	$3.51/million Btu
Cost of Residential Heating at 60% Efficiency	$5.85/million Btu

Source: *Gas Supply Review* 3, 9 (1974) November 15.

(Source 41)

COMPARISON OF INVESTMENT AND OPERATING COSTS FOR LIQUID FUELS FROM COAL USING CONSOL SYNTHETIC FUEL (CSF) AND HYDROCARBON RESEARCH (HRI) PROCESSES (12% Discounted Cash Flow [DCF] Accounting Method, 90% Stream Factor)

Process	CSF		HRI	
Product	Heavy Fuel Oil Plus Naphtha		Heavy Fuel Oil Plus Naphtha	
Coal Type	Pittsburgh		Illinois	
Coal Cost, ¢/million Btu	30		30	
Total Plant Investment (Including Contractor's Overhead and Profit and 15% Contingency),	Based on Total Plant Output	Based on Liquid Fuel Output Only	Based on Total Plant Output	Based on Liquid Fuel Output Only
$/million Btu-day	871	1333	868	971
Total Capital Required (Including Interest During Construction, Start-Up Cost, and Working Capital),				
$/million Btu-day	1180	1805	1183	1322
Purchased Power, kWhr/million Btu output	2.8	4.3	9.3	10.4
Process Thermal Efficiency, %				
Liquid Fuels	44.3		58.9	
Gaseous Fuels	21.6		5.3	
Overall, Including By-Products	67.8		65.8	
Components of Liquid Product Price	$/Million Btu Liquid Product			
Coal Cost	0.67		0.50	
Direct Operating Cost	0.51		0.58	
By-Product Credit*	(0.29)	(0.78)	(0.08)	(0.17)
Subtotal	0.89	0.40	1.00	0.91
Capital-Associated Cost	1.05	1.05	0.61	0.61
Total	1.94	1.45	1.61	1.52

* Left-hand column based on by-product fuel-gas credit of 50¢/million Btu and right-hand column based on by-product fuel-gas credit of $1.50/million Btu. By-product sulfur credited at $10/LT; ammonia at $25/ton in both columns.

(Source 41)

TYPICAL PRODUCTS, SASOL PROCESS[5]

	Fixed-Bed Process	Fluid-Bed Process
	Liquid Product Composition	
Liquefied Petroleum Gas (C_3-C_4)	5.6	7.7
Petrol (C_5-C_{11})	33.4	72.3
Middle Oils (diesel, furnace, etc.)	16.6	3.4
Waxy Oil or Slack Wax	10.3	3.0
Medium Wax, 203°-206°F mp	11.8	--
Hard Wax, 203°-206°F mp	18.0	--
Alcohols and Ketones	4.3	12.6
Organic Acids	traces	1.0

	Fixed-Bed Process		Fluid-Bed Process	
	C_5-C_{10}	C_{11}-C_{18}	C_5-C_{10}	C_{11}-C_{14}
	Liquid Product Composition			
Paraffins, vol %	45	55	13	15
Olefins	50	40	70	60
Aromatics	0	0	5	15
Alcohols	5	5	6	5
Carbonyls	traces	traces	6	5

PROCESS YIELD, SASOL PROCESS[3,4]

Products	Gallons per Ton of Coal
Liquefied Petroleum Gas	0.18
Gasoline	25.72
Kerosene	0.31
Diesel Fuel	2.56
Fuel Oil	0.63
Wax Oil and Wax	2.06
Methanol	0.11
Ethanol	2.17
Methyl Ethyl Ketone	0.15
Acetone	0.12
	34.01
Gas	5500 SCF (500 Btu/SCF)

(Source 41)

ENERGY BALANCE – COAL TO GASOLINE
(CSF Process and Refinery, 50,000 bbl/Day)

Input	10^6 Btu/hr
Coal, as received (1218.4 tons/hr X 2000 X 10,820 Btu/lb)	26,365
Electric Power (50,033 kWhr/hr X 3413 Btu/kWhr)	171
Total	26,536
Output	
Gasoline (2076.7 bbl/hr X 5.4 million Btu/bbl)	11,214
Butane (187.5 bbl/hr X 4.3 million Btu/bbl)	806
Fuel Gas (4.95 X 10^6 SCF/hr X 819 Btu/SCF)	4,054
Sulfur (43.68 tons/hr X 2000 X 3983 Btu/lb)	348
Ammonia (5.37 tons/hr X 2000 X 9675 Btu/lb)	104
Cooling by Air and Water	3,155
Other (by difference)*	6,855
Total	26,536

*Includes sensible heat of product streams, heating values of other unaccounted-for products, and heat lost to the atmosphere.

SULFUR BALANCE
(CSF Process, 50,000 bbl/Day)

Input	lb/hr (as sulfur)
Coal	89,482
Output	
Elemental Sulfur (by product)	87,367
Sulfur in Liquid Products	24
Sulfur From the Refinery Off-Gas	580
Sulfur Compounds to Atmosphere From Sulfur Recovery Plants	80
Sulfur in the Stack Gas	1,431
Total	89,482

(Source 41)

INVESTMENT COST FOR COAL-TO-GASOLINE PLANT
(Using Consol Synthetic Fuel Process and Refinery)
(50,000 bbl/Day Gasoline Plant)

Components	Mid-1973 Cost, $1000
Coal Preparation	14,024
Extraction	11,002
Residue Separation	4,953
Solvent Recovery	6,783
Low-Temperature Carbonization	11,938
Tar Distillation	2,758
Extract Hydroconversion and Distillation	52,693
Fuel-Gas Compression and Treatment	9,354
Hydrogen Production System (Using Lurgi Gasification System)	130,425
Refinery and General Facilities for Refinery	117,480
Sulfur Recovery System	8,599
Wastewater Treatment	1,739
BFW Treatment, Steam and Power Generation System	28,377
Cooling Towers and Pumps	11,192
Initial Catalyst and Chemicals	1,813
Power Distribution	3,030
General Facilities	28,515
Total Direct Cost of Plant, Including Contractor's Overhead and Profit	444,675
Contingencies (15%)	66,701
Total Plant Investment (I)	511,376
Interest During Construction (0.23676 X I)	121,073
Start-Up Cost (20% of gross operating cost)	24,445
Working Capital	
a. Coal Inventory (60 days feed at full rate)	11,390
b. Materials and Supplies (0.9% of total plant investment)	4,602
c. Net Receivables (1/24 X Annual Revenue Received)	9,448
Total Capital Required	682,334

(Source 41)

INVESTMENT COST FOR COAL-TO-FUEL OIL PLUS NAPHTHA PLANT

(Using Consol Synthetic Fuel Process)
(47,400 bbl/Day Fuel Oil Plus Naphtha Plant)

Components	Mid-1973 Cost, $1000
Coal Preparation	14,024
Extraction	11,002
Residue Separation	4,953
Solvent Recovery	6,783
Low-Temperature Carbonization	11,938
Tar Distillation	2,758
Extract Hydroconversion and Distillation	52,693
Fuel-Gas Compression and Treatment	9,354
Hydrogen Production System (Using Lurgi Gasification System)	130,425
Sulfur Recovery System	8,599
Wastewater Treatment	1,739
BFW Treatment, Steam and Power Generation System	28,377
Cooling Towers and Pumps	11,192
Initial Catalyst and Chemicals	1,813
Power Distribution	3,030
General Facilities	28,515
Total Direct Cost of Plant Including Contractor's Overhead and Profit	327,195
Contingencies (15%)	49,079
Total Plant Investment (I)	376,274
Interest During Construction (0.23676 X I)	89,087
Start-Up Cost (20% of gross operating cost)	21,894
Working Capital	
a. Coal Inventory (60 days feed at full rate)	11,390
b. Materials and Supplies (0.9% of total plant investment)	3,386
c. Net Receivables (1/24 X Annual Revenue Received)	7,503
Total Capital Required	509,534

(Source 41)

ENERGY BALANCE COAL TO SNG
(288.6 Million SCF/Day SNG Plant)

Input	10^6 Btu/hr
Coal to Gasifier (969.24 tons/hr X 2000 X 8664 Btu/lb)	16,795.0
Coal for Fuel Gas (207.7935 tons/hr X 2000 X 8664 Btu/lb)	3,600.6
Total Input	20,395.6
Output	
Product Gas (288.6 X 10^6 SCF/day X 1/24 X 954 Btu/SCF)	11,471.9
Tar (88,824 lb/hr X 16,670 Btu/lb)	1,480.7
Tar Oil (48,588 lb/hr X 17,300 Btu/lb)	840.6
Phenols (11,271 lb/hr X 14,021 Btu/lb)	158.0
Naphtha (20,005 lb/hr X 18,400 Btu/lb)	368.1
Ammonia (21,422 lb/hr X 9598 Btu/lb)	205.6
Sulfur (15,582 lb/hr X 3983.4 Btu/lb)	62.1
Carbon in Ash (477,080 lb/hr X 704.3 Btu/lb)	336.0
Cooling Water	1,206.0
Other by Difference*	4,260.6
Total Output	20,395.6

* includes sensible heat of product streams, heating values of other unaccounted-for products, and heat lost to the atmosphere.

SULFUR BALANCE
(288.6 Million SCF/Day SNG Plant)

Input	lb/hr (as sulfur)
Coal to Gasifier	13,378
Coal for Fuel Gas	2,868
Total Input	16,246
Output	
Elemental Sulfur (by-product)	15,582
Sulfur Compounds to Atmosphere From Sulfur Recovery Plant	133
From Turbine, Boiler, and Heater Effluents (SO_2 discharged to atmosphere)	167
Sulfur in By-Products (i.e., with tar, tar oil, naphtha, ammonia solution)	364
Total Sulfur	16,246

(Source 41)

. INVESTMENT COST FOR COAL-TO-SNG PLANT
(Lurgi Process, 288.6 Million SCF/Day Plant)

Components	Mid-1973 Cost, $1000
Gas Production System (including lock gas storage and compression)	66, 370
CO-Shift	7, 680
Gas Cooling and Heat Recovery	8, 080
Gas Purification (including refrigeration)	40, 640
Methane Synthesis	18, 550
Product Gas Compression and Dehydration	5, 660
Gas Liquor Treatment and By-Product Recovery	18, 650
Sulfur Recovery System	8, 160
Fuel-Gas Production System	21, 620
Fuel-Gas Cooling and Treatment	5, 320
Air Compression	20, 470
Steam and Power Generation	30, 200
Oxygen Production and Compression	28, 930
Cooling Water System	5, 800
Raw Water Treatment System and Miscellaneous Plant Utility Systems	12, 390
Ash Dewatering and Transfer	6, 320
Raw Water Storage, Pumping, Pipeline and River Water Pumping	14, 210
Initial Catalyst and Chemicals	4, 010
General Facilities	34, 720
Total Direct Cost of Plant Including Contractor Engineer Fees, Licenses, and State Tax	357, 780
Contingencies (15%)	53, 667
Total Plant Investment (I)	411, 447
Interest During Construction (0, 23676 X I)	97, 414
Start-Up Cost (20% of gross operating cost)	17, 388
Working Capital	
a. Coal inventory (60 days feed at full rate)	8, 811
b. Materials and supplies (0.9% of total plant investment)	3, 703
c. Net receivables (1/24 X annual revenue received)	7, 273
Total Capital Required	546, 036

(Source 41)

INVESTMENT COST FOR COAL-TO-METHANOL PLANT USING KOPPERS-TOTZEK GASIFICATION AND ICI METHANOL PROCESSES (5000 Ton/Day Methanol Plant)

Components	Mid-1973 Cost, $1000
Coal Storage	1,900
Syn-Gas Train	33,000 (Ref. 3)
Syn-Gas Compressor I	11,100
CO-Shift	4,730
CO-Shift Waste Heat Recovery	1,430
Hot Carbonate System	13,500
Trace H_2S Removal	820
Syn-Gas Compressor II	3,000
Methanol Loop	30,170
Air Separation Plant	37,200
Oxygen Compressor	1,100
Steam Generation and BFW Pumps	18,380
BFW Treatment	7,600
Cooling Tower and Pumps	6,100
Wastewater Treatment	10,300
Particulate Emission Control	1,740
Sulfur Recovery	5,080
Wellman-Lord Stack-Gas Cleanup	12,270
Turbo Generator	3,330
Power Distribution System	4,000
General Facilities	5,000
	211,750
Contractor's Overhead and Profit (10%)	21,175
	232,925
Contingencies (15%)	34,900
Total Plant Investment (I)	267,825
Interest During Construction (0.23676 X I)	63,410
Start-Up Cost (20% of gross operating cost)	10,002
Working Capital	
a. Coal Inventory (60 days feed at full rate)	4,433
b. Materials and Supplies (0.9% of total plant investment)	2,410
c. Net Receivables (1/24 X annual revenue received)	4,888
Total Capital Required	352,968

(Source 18)

ESTIMATED SELLING PRICES FOR ENVIRONMENTALLY ACCEPTABLE SYNTHETIC FUELS FROM COAL

($1973 /$10^6$ BTU)

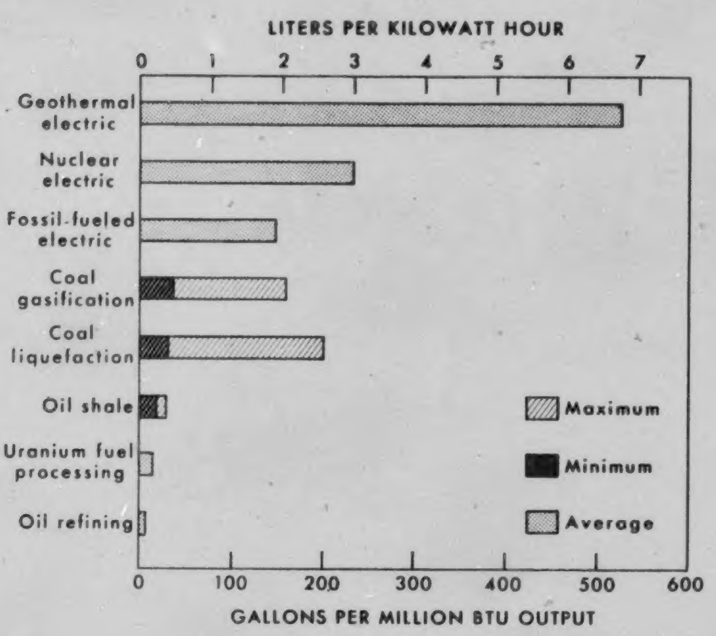
	WESTERN COAL	ILLINOIS COAL	APPALACHIAN COAL
COAL COST	0.15	0.40	0.40
LOW BTU GAS*	0.70-0.90	0.95-1.15	1.35-1.55
INTERMEDIATE BTU GAS*	0.80-1.00	1.15-1.35	1.55-1.75
HIGH BTU GAS*	1.00-1.20	1.40-1.60	1.80-2.00
METHANOL*	1.00-1.20	1.40-1.60	1.80-2.00
"LIQUIDS"*	1.15-1.35	1.55-1.75	1.95-2.15
<0.3%S DISTILLATE (~#2 OIL)** OR CRUDE EQUIV.	1.20	1.50	1.50
<0.8%S EXTRACT (~#6 OIL)**	1.00	1.30	1.30
SOLIDS**	1.00	1.30	1.30

*Higher price estimates for gases, methanol and "liquids" are from processes using known technologies. Lower prices are estimated achievable from new approaches. Prices are based on large sized commercial plants putting out product in quantity of about 0.08 x 10^{15} BTU per year or better.

**Costs estimates for plants converting 25,000 tons per day of coal, an input of about 0.20 x 10^{15} BTU per year.

(Source 4)

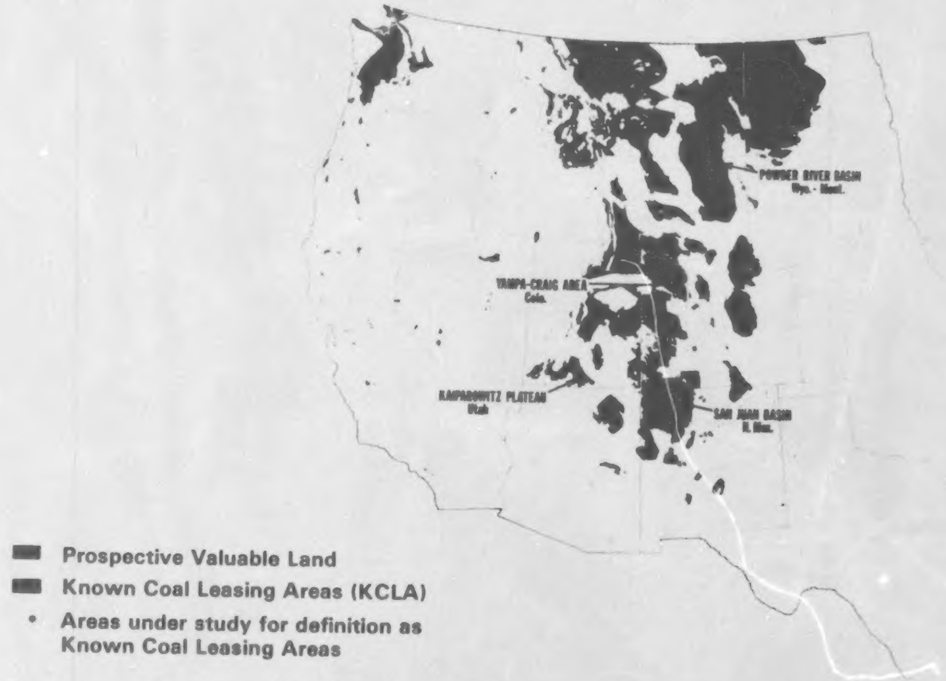
Water Consumption in Refining and Conversion Processes



MISCELLANEOUS DATA

(Source 17)

Known Federal Coal Leasing Areas for Competitive Bidding


POWDER RIVER BASIN
Wyo. - Mont.
YAMPA-CRAIG AREA
Colo.
KAIPAROWITZ PLATEAU
Utah
SAN JUAN BASIN
N. Mex.

- ▬ Prospective Valuable Land
- ▬ Known Coal Leasing Areas (KCLA)
- • Areas under study for definition as Known Coal Leasing Areas

(Source 3)

Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, by States

State	1972				1973			
	Underground	Strip	Auger	Total	Underground	Strip	Auger	Total
Alabama	$14.20	$7.01	$6.18	$9.63	$15.54	$8.04	$6.69	$11.01
Alaska	---	W	---	W	---	W	---	W
Arizona	---	W	---	W	---	W	---	W
Arkansas	12.50	10.90	---	10.93	13.89	13.36	---	13.37
Colorado	8.34	4.10	---	6.45	9.95	4.43	5.51	7.41
Illinois	6.83	5.49	---	6.14	7.52	5.81	---	6.71
Indiana	6.62	5.51	---	5.58	6.94	6.04	---	6.06
Iowa	4.80	4.91	---	4.86	5.40	5.54	---	5.46
Kansas	---	6.39	---	6.39	---	7.35	---	7.35
Kentucky:								
Eastern	9.46	6.23	6.20	8.01	10.63	7.05	7.22	9.03
Western	5.97	4.81	5.64	5.23	6.49	5.53	---	5.93
Total	8.31	5.38	6.20	6.81	9.16	6.18	7.22	7.73
Maryland	4.42	5.56	5.71	5.46	7.00	7.65	7.78	7.63
Missouri	---	5.20	---	5.20	---	5.37	---	5.37
Montana:								
Bituminous	9.74	2.00	---	2.01	16.81	2.82	---	2.83
Lignite	---	2.45	---	2.45	---	2.60	---	2.60
Total	9.74	2.01	---	2.03	16.81	2.82	---	2.82
New Mexico	10.72	2.66	---	3.61	10.00	2.94	---	3.51
North Dakota (lignite)	---	2.02	---	2.02	---	2.07	---	2.07
Ohio	7.41	5.29	4.69	5.96	8.50	6.82	6.20	7.40
Oklahoma	15.00	7.01	---	7.28	---	7.69	---	7.69
Pennsylvania	10.39	6.86	6.37	9.14	12.02	7.68	6.91	10.30
Tennessee	7.56	6.83	7.70	7.23	8.61	7.69	8.52	8.13
Texas (lignite)	---	W	---	W	---	W	---	W
Utah	8.93	8.00	---	8.93	11.19	---	---	11.19
Virginia	11.56	6.70	6.46	10.11	12.70	7.66	7.33	11.12
Washington	16.40	6.51	---	6.61	17.74	6.50	---	6.56
West Virginia	10.90	7.54	7.95	10.31	12.24	8.58	8.66	11.61
Wyoming	4.89	3.69	---	3.74	7.07	4.01	---	4.09
Total	9.70	5.48	6.54	7.66	10.84	6.11	7.39	8.53

W Withheld to avoid disclosing individual company confidential data.

(Source 3)

Production and average value per ton, f.o b. mines, of bituminous coal and lignite sold in open market and not sold in open market, by State

(Thousand short tons)

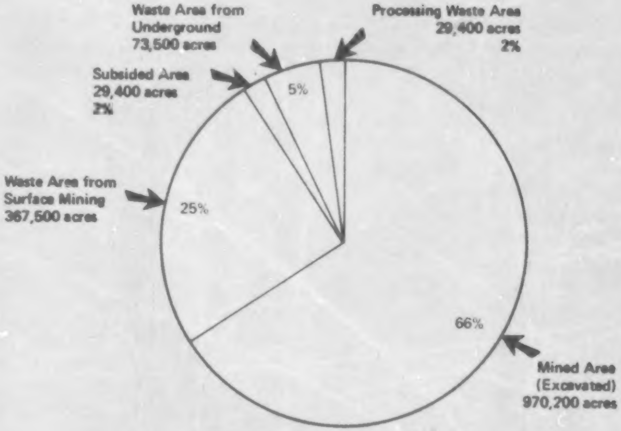
State	Production			Average value per ton, f.o.b. mines		
	Sold in open market	Not sold in open market	Total 1/	Sold in open market	Not sold in open market	Total
Alabama	15,226	4,004	19,230	$10.01	$14.79	$11.01
Alaska	694	---	694	W	---	W
Arizona	3,247	---	3,247	W	---	W
Arkansas	434	---	434	13.37	---	13.37
Colorado	4,954	1,279	6,233	5.32	15.50	7.41
Illinois	59,004	2,568	61,572	6.55	10.50	6.71
Indiana	25,253	---	25,253	6.06	---	6.06
Iowa	601	---	601	5.46	---	5.46
Kansas	1,086	---	1,086	7.35	---	7.35
Kentucky:						
Eastern	65,588	8,378	73,966	8.44	13.72	9.03
Western	53,679	---	53,679	5.93	---	5.93
Total	119,267	8,378	127,645	7.31	13.72	7.73
Maryland	1,789	---	1,789	7.63	---	7.63
Missouri	4,658	---	4,658	5.37	---	5.37
Montana:						
Bituminous	10,411	---	10,411	2.83	---	2.83
Lignite	1	313	314	6.50	2.58	2.60
Total	10,412	313	10,725	2.83	2.58	2.82
New Mexico	8,278	792	9,069	2.91	9.87	3.51
North Dakota (lignite)	5,003	1,903	6,906	2.00	2.26	2.07
Ohio	40,804	4,979	45,783	7.30	8.22	7.40
Oklahoma	1,993	190	2,183	6.99	15.04	7.69
Pennsylvania	52,929	23,474	76,403	8.71	13.88	10.30
Tennessee	8,219	---	8,219	8.13	---	8.13
Texas (lignite)	---	6,944	6,944	---	W	W
Utah	2,563	2,937	5,500	6.50	15.29	11.19
Virginia	33,003	958	33,961	11.00	15.30	11.12
Washington	24	3,246	3,270	14.10	6.50	6.56
West Virginia	103,214	12,234	115,448	11.13	15.62	11.61
Wyoming	11,277	3,609	14,886	4.31	3.40	4.09
Total	513,929	77,808	591,738	8.06	11.65	8.53

W Withheld to avoid disclosing individual company confidential data.
1/ Data may not add to totals shown because of independent rounding.

(Source 17)

Cumulative Land Use, Bituminous Coal Mining, 1930-71

TOTAL: 1,470,000 Acres



(Source 3)

Underground mine data for bituminous coal by State

(Thousand short tons)

State	Number of mines	Production	Cut by hand and shot from solid	Cut by machines: Quantity	Cut by machines: Number of coal cutting machines	Cut by machines: Average output per machine	Mined by continuous mining machines	Mined by longwall machines	Number of mines using power drills	Face or coal drills: Handheld and post mounted: Number	Face or coal drills: Handheld and post mounted: Quantity	Face or coal drills: Mobile: Number	Face or coal drills: Mobile: Quantity	Roof or rock drills: Roof bolting: Rotary	Roof bolting: Percussion	Roof bolting: Rotary-Percussion	Other uses: Rotary	Other uses: Percussion	Other uses: Rotary-Percussion
Alabama	21	7,618	13	6,755	63	107	847	-----	16	12	818	52	5,960	159	4	8	5	10	-----
Arkansas	1	3	-----	3	1	3	-----	-----	1	1	3	-----	-----	[illegible]	-----	-----	-----	-----	-----
Colorado	21	3,361	1	66	8	8	2,982	318	3	[illegible]	66	-----	-----	60	2	-----	-----	-----	-----
Illinois	23	32,570	-----	5,716	28	204	26,833	21	20	6	1,025	22	3,091	[illegible]	-----	-----	6	2	-----
Indiana	3	789	-----	174	2	22	614	-----	3	-----	-----	2	174	6	-----	-----	-----	2	-----
Iowa	2	356	-----	356	3	155	-----	-----	2	-----	-----	3	356	3	-----	-----	-----	-----	-----
Kentucky:																			
Eastern	584	40,553	3,296	23,234	401	58	13,831	187	470	461	11,748	112	11,431	176	23	43	3	-----	13
Western	26	22,342	-----	22,342	102	219	-----	-----	26	1	6	99	22,066	148	-----	-----	-----	-----	-----
Total 1/	[illegible]	62,895	3,296	45,580	503	91	13,831	187	496	462	11,754	211	33,496	324	23	43	3	-----	13
Maryland	[illegible]	66	-----	-----	-----	-----	66	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Montana (bituminous)	1	1	-----	1	1	1	-----	-----	1	1	1	-----	-----	-----	-----	-----	-----	-----	-----
New Mexico	1	733	-----	-----	-----	-----	611	122	1	-----	-----	-----	-----	6	-----	-----	-----	-----	-----
Ohio	28	16,225	-----	5,292	52	102	10,933	-----	22	8	667	39	4,644	203	-----	2	-----	-----	-----
Pennsylvania	134	46,207	4	1,843	56	33	41,611	2,749	92	36	615	21	1,422	239	169	[illegible]	-----	12	2
Tennessee	44	3,638	5	2,265	61	37	1,366	-----	45	59	1,249	6	1,020	25	1	1	-----	-----	-----
Utah	16	5,500	-----	469	4	117	4,217	814	14	-----	-----	4	469	13	16	[illegible]	-----	-----	2
Virginia	300	23,437	631	9,756	283	34	11,317	1,733	246	256	5,509	70	4,816	256	100	1	3	-----	-----
Washington	1	16	16	-----	-----	-----	-----	-----	1	6	16	-----	-----	-----	1	-----	-----	-----	-----
West Virginia	522	95,516	321	28,635	442	-----	63,057	3,503	398	225	9,453	272	20,002	717	103	96	2	5	9
Wyoming	3	425	-----	110	8	14	315	-----	3	4	7	4	103	8	-----	1	-----	-----	-----
Total 1/	1,737	299,353	4,288	107,024	1,535	70	178,400	9,442	1,366	1,082	31,763	706	76,333	2,059	419	290	19	31	29

1/ Data may not add to totals shown because of independent rounding.

(Source 3)

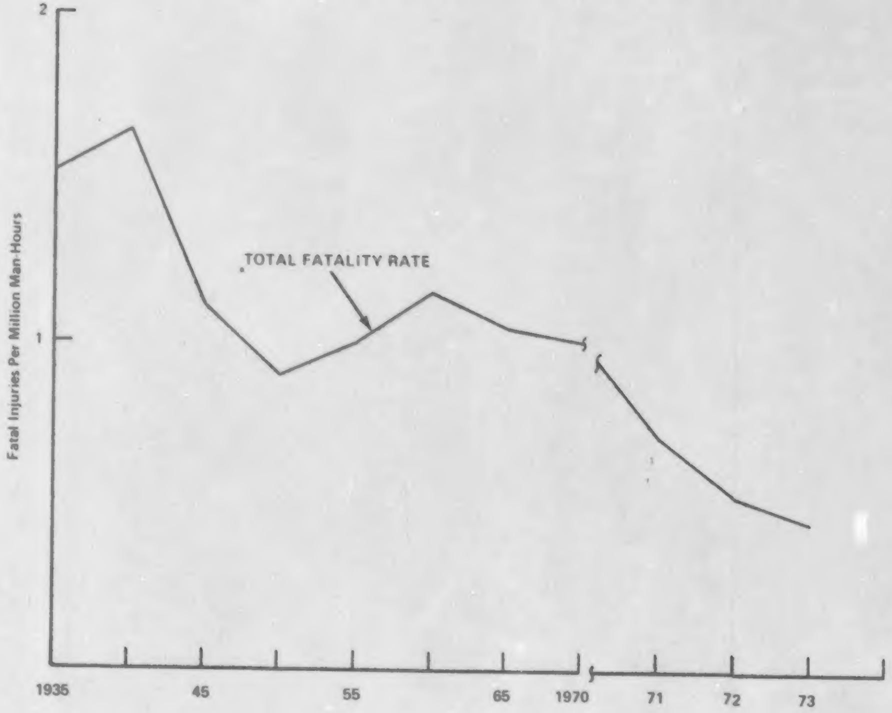
Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment, by State

State	Number of strip mines	Production (thousand short tons)	Number of power shovels and dragline excavators										Total	Number of carryall scrapers	Number of bulldozers	Front-end loaders	Wheel excavators	Power brooms	Motor graders	Coal drills
			By type of power				By capacity of dipper or bucket, cubic yards				By type of machine									
			Electric	Diesel electric	Diesel	Gasoline	Less than 6	6-15	16-50	More than 50	Power shovels	Dragline excavators								
Alabama	83	11,520	14	13	86	1	62	27	22	3	70	44	114	5	192	101	-----	3	20	8
Alaska	1	696	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	5	4	-----	-----	2	1
Arizona	2	3,247	3	1	-----	-----	-----	-----	3	1	2	2	4	-----	5	2	-----	-----	1	1
Arkansas	10	432	1	3	4	-----	1	7	-----	-----	1	7	8	-----	17	10	-----	2	3	-----
Colorado	8	2,834	4	2	3	-----	3	4	2	-----	3	6	9	2	18	15	-----	-----	3	8
Illinois	32	29,002	71	13	25	1	34	33	21	22	58	52	110	16	172	58	11	2	39	26
Indiana	36	26,465	60	3	50	-----	53	34	14	12	59	54	113	7	172	65	-----	-----	22	8
Iowa	10	241	-----	-----	20	-----	17	3	-----	-----	7	13	20	4	15	6	-----	-----	3	11
Kansas	[illegible]	[illegible]	[illegible]	-----	[illegible]	-----	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-----	[illegible]	[illegible]	-----	-----	[illegible]	-----
Kentucky:																				
Eastern	399	23,671	1	2	518	44	535	29	1	-----	558	7	565	11	411	318	-----	13	81	11
Western	55	31,337	58	9	86	-----	89	40	16	8	112	41	153	4	261	91	-----	1	33	8
Total	454	55,008	59	11	604	44	624	69	17	8	670	48	718	15	672	409	-----	14	114	19
Maryland	46	1,643	-----	-----	66	-----	58	8	-----	-----	44	22	66	-----	65	51	-----	-----	6	1
Missouri	10	[illegible]	13	1	31	-----	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	67	21	-----	[illegible]	[illegible]	-----
Montana:																				
Bituminous	3	10,410	7	-----	-----	-----	-----	3	4	-----	4	3	7	5	14	9	-----	-----	4	4
Lignite	2	316	1	-----	2	-----	2	1	-----	-----	2	1	3	1	3	3	-----	1	1	1
Total	5	10,726	8	-----	2	-----	2	4	4	-----	6	4	10	6	17	12	-----	1	5	5
New Mexico	5	8,336	5	1	3	-----	1	3	5	-----	4	5	9	2	16	10	-----	-----	8	5
North Dakota (lignite)	12	6,908	16	1	7	1	14	8	5	-----	17	10	27	13	29	13	-----	2	13	8
Ohio	176	28,527	37	20	267	5	229	81	13	6	222	107	329	114	576	301	-----	19	81	4
Oklahoma	11	2,143	7	2	9	-----	10	3	2	3	8	10	18	8	32	30	-----	3	9	3
Pennsylvania	775	29,629	18	45	702	20	602	176	7	-----	470	315	785	90	1,009	848	-----	1	62	11
Tennessee	56	4,236	-----	2	77	-----	70	9	-----	-----	74	5	79	7	135	129	-----	12	25	9
Texas (lignite)	3	6,944	8	-----	3	-----	2	3	4	2	6	5	11	2	12	6	-----	-----	6	-----
Virginia	242	8,700	-----	2	227	9	215	22	1	-----	223	15	238	36	308	201	-----	13	68	21
Washington	2	3,256	5	-----	2	-----	2	1	2	2	4	3	7	11	20	3	-----	-----	3	-----
West Virginia	305	17,706	-----	2	284	8	264	30	-----	-----	273	21	294	25	506	338	-----	14	84	25
Wyoming	13	16,001	16	-----	10	1	10	11	4	2	17	10	27	27	38	31	-----	1	19	9
Total [1]	2,389	276,665	351	122	2,466	92	2,287	545	135	64	2,259	772	3,031	390	4,070	2,520	11	82	500	182

[1] Data may not add to totals shown because of independent rounding.

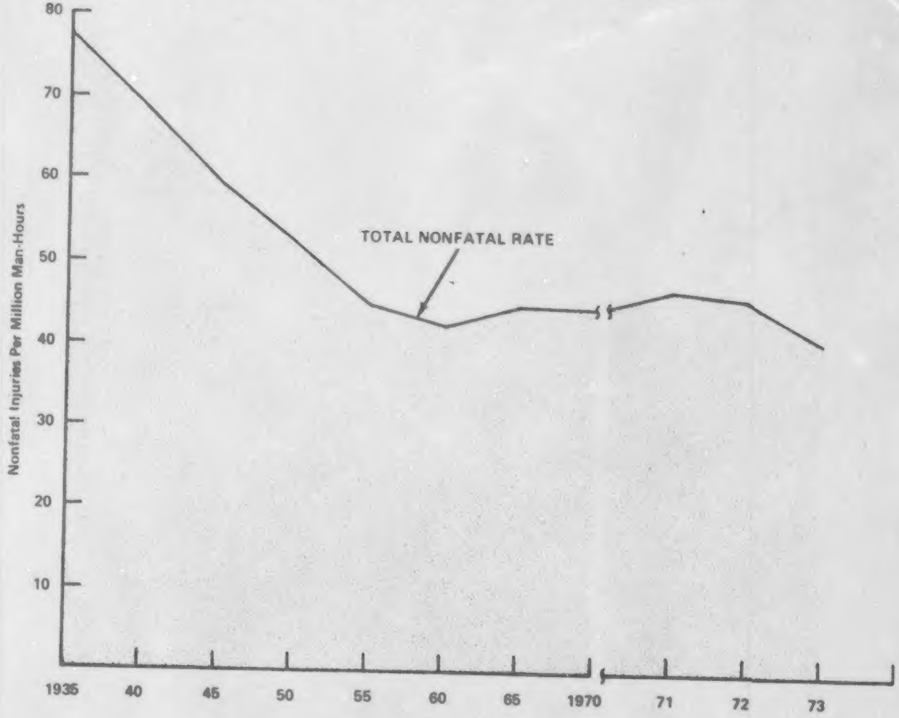
(Source 17)

Fatal Injuries, U.S. Coal Mining, 1935-73



(Source 17)

Nonfatal Injuries, U.S. Coal Mining, 1935-73



ANNUAL AVERAGE HEAT VALUES

(Source 3)

Annual average unit heat value of bituminous coal and lignite produced and consumed in the United States, 1955-1973 1/
British thermal units (Btu) per pound

Year	Total Production			Domestic Consumption		
	Thousand short tons	Trillion of Btu	Average Btu per pound	Thousand short tons	Trillion of Btu	Average Btu per pound
1955 ----	464,633	12,080	13,000	423,412	10,940	12,290
1956 ----	500,874	13,013	12,990	432,858	11,142	12,870
1957 ----	492,704	12,800	12,990	413,668	10,640	12,860
1958 ----	410,446	10,663	12,990	366,703	9,366	12,770
1959 ----	412,028	10,581	12,840	366,256	9,332	12,740
1960 ----	415,512	10,662	12,830	380,429	9,693	12,740
1961 ----	402,977	10,308	12,790	374,405	9,502	12,690
1962 ----	422,149	10,782	12,790	387,776	9,826	12,670
1963 ----	458,928	11,712	12,760	409,225	10,353	12,650
1964 ----	486,998	12,418	12,750	431,116	10,899	12,640
1965 ----	512,088	13,017	12,710	459,164	11,580	12,610
1966 ----	533,881	13,507	12,650	486,266	12,205	12,550
1967 ----	552,626	13,904	12,580	480,416	11,981	12,470
1968 ----	545,245	13,664	12,530	498,830	12,401	12,430
1969 ----	560,505	13,957	12,450	507,275	12,509	12,330
1970 ----	602,932	14,820	12,290	515,619	12,488	12,110
1971 ----	552,192	13,385	12,120	494,862	11,857	11,980
1972 ----	595,386	14,319	12,025	516,776	12,273	11,875
1973 ----	591,738	14,208	12,005	556,022	13,150	11,825

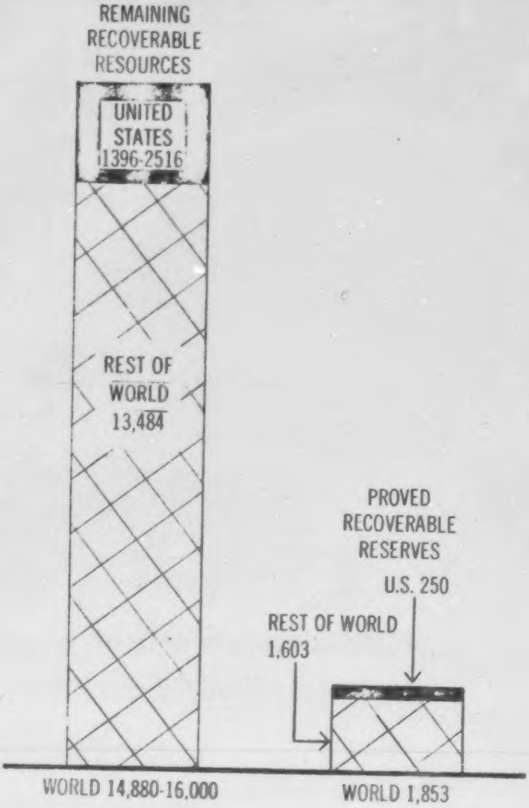
1/ Prior to 1973 the average heat content of the annual output of bituminous coal and lignite was measured at 13,100 Btu's per pound. This value was based on an estimate made in 1949 (U.S. Bureau of Mines Information Circular 7538). In recent years this heat value has not been representative of the average unit heat value of the total annual coal supply because of the large annual increases in utilization of coal of lower heat values by the electric utility industry. The annual production values shown in this table are weighted averages of known and estimated Btu values of coal shipments to each major consuming sector. They include, for example, the Btu value of coal consumed at electric utility generating plants as reported to the Federal Power Commission and compiled by the National Coal Association. Currently, electric utility plants account for 70 percent of total domestic coal consumption. The averages for United States consumption exclude shipments overseas and to Canada the preponderance of which is of high-Btu value metallurgical coal thus accounting for the difference in values between total production and domestic consumption.

GAS
UNITED STATES AND FOREIGN STATISTICS

(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR NATURAL GAS

(Trillion Cubic Feet)



(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR NATURAL GAS
(Excluding Natural Gas Liquids)

	Trillion Cubic Feet	Quadrillion Btu
Remaining Recoverable Resources 1/		
United States	1,396-2,516 2/ (1,468 3/)	1,440-2,597 (1,515)
Rest of World	13,484	13,915
World	14,880-16,000	15,355-16,512
Proved Recoverable Reserves 4/		
United States	250	258
Rest of World	1,603	1,654
World	1,853	1,912

1/ Estimated remaining recoverable resources, discovered and undiscovered, that could be made available under certain economic and technological conditions.

2/ Estimated by U.S. Geological Survey, as of March 26, 1974.

3/ Estimated by Potential Supply Committee as of December 31, 1972.

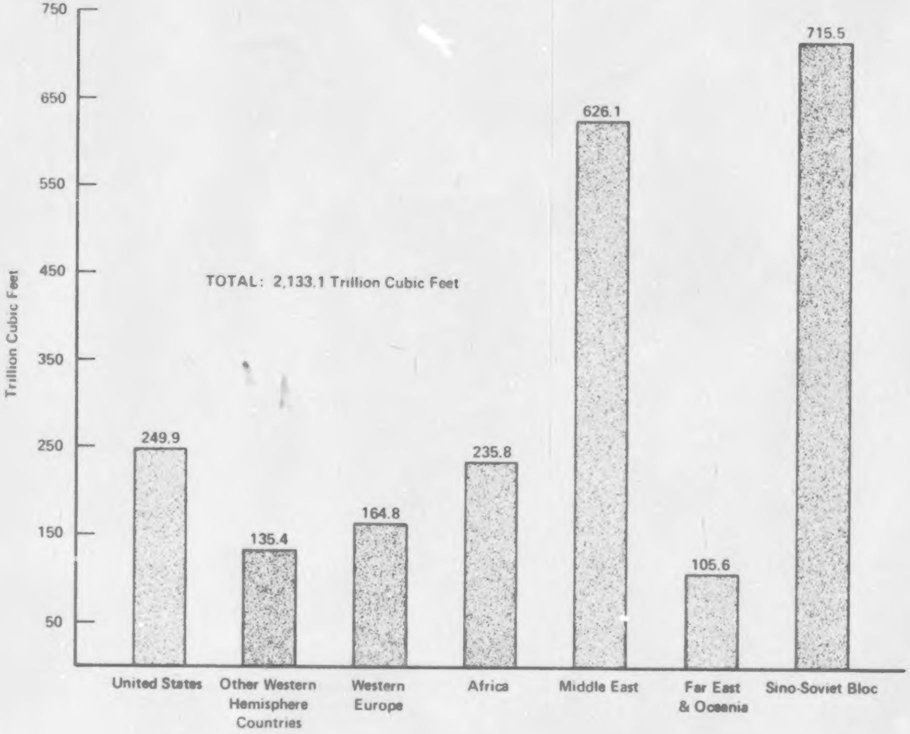
4/ Proved reserves are those recoverable under existing economic and operating conditions as reported by the American Gas Association as of December 31, 1973.

Sources: Reserves of ... Natural Gas in the United States ...., American Gas Association, Vol. 26, 1972; Natural Gas Resources of the United States and the World, Administrative Report Prepared by the Geological Survey for the FPC National Gas Survey, 1973; Summary Petroleum and Selected Mineral Statistics for 120 Countries ... Geological Survey Professional Paper 817, 1973; Commodity Data Summaries, 1974, Bureau of Mines, U.S. Department of the Interior; Potential Supply of Natural Gas in the United States, Potential Gas Agency 1972; U.S. Department of the Interior, Press Release, Geological Survey, March 26, 1974.

Prepared by: Office of Economics, Federal Power Commission.

(Source 17)

World Natural Gas Reserves, 1973



(Source 9)

SUMMARY OF ANNUAL ESTIMATES OF NATURAL GAS RESERVES IN CANADA, 1955-1973

Note: Volumes are calculated at a pressure base of 14.65 psia and at a standard temperature of 60°F.

(Millions of cubic feet)

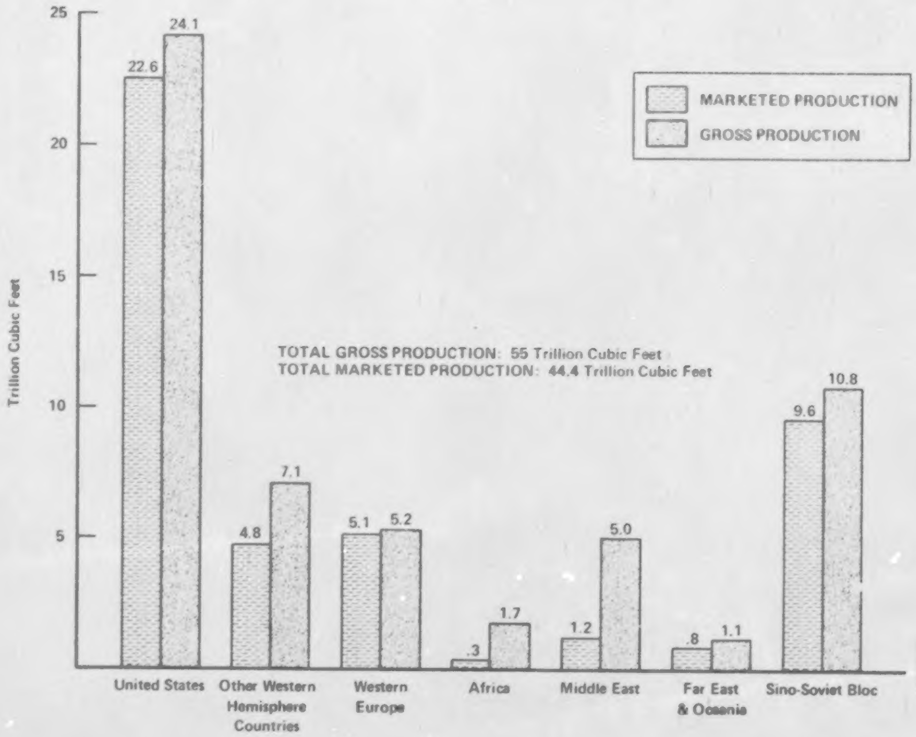
	Proved Remaining at Beginning of Year	Changes Due To: Revisions	Revisions and Extensions	Extensions	Discoveries	Net Change in Underground Storage	Net Production	Proved Remaining at End of Year	Change During Year	Probable Remaining at End of Year a
RECOVERABLE GAS										
1955	14,335,761	–	1,879,812	–	584,242	1,638	165,796	16,637,757	2,301,996	–
1956	16,637,757	–	2,459,433	–	739,148	4,155	218,854	19,621,637	2,983,880	–
1957	19,621,637	–	599,261	–	795,490	2,815	277,072	20,742,131	1,120,494	–
1958	20,742,131	–	2,461,506	–	469,892	2,138	380,615	23,295,052	2,552,921	–
1959	23,295,052	–	2,983,362	–	790,660	34,281	498,019	26,605,336	3,310,284	–
1960	26,605,336	–	4,311,815	–	290,058	5,435	539,592	30,674,052	4,068,716	–
1961	30,674,052	–	3,031,891	–	619,567	(288)	787,372	33,537,850	2,863,798	–
1962	33,537,850	–	2,395,280	–	453,113	(390)	948,961	35,436,892	1,899,042	38,618,637
1963	35,436,892	(47,947)	–	1,249,289	1,301,332	25,606	1,005,149	36,960,023	1,523,131	42,070,323
1964	36,960,023	3,250,273	–	3,879,899	386,948	27,759	1,114,028	43,390,874	6,430,851	50,155,713
1965	43,390,874	(518,608)	–	2,082,486	676,813	(7,756)	1,251,500	44,372,291	981,417	50,964,955
MARKETABLE GAS										
1964	32,992,252	–	–	–	–	–	–	39,319,544	6,327,292	45,572,431
1965	39,319,544	–	–	–	–	–	–	40,354,527	1,034,983	46,434,950
1966	40,354,527	2,158,536	–	1,532,317	512,086	17,918	1,125,289	43,450,095	3,095,568	49,269,076
1967	43,450,095	1,572,424	–	1,268,002	603,459	4,120	1,216,049	45,682,051	2,231,956	50,945,169
1968	45,682,051	230,116	–	2,867,357	282,913	(1,255)	1,394,721	47,666,461	1,984,410	54,185,935
1969	47,666,461	2,043,615	–	2,690,603	1,104,652	2,197	1,556,533	51,950,995	4,284,534	57,467,963
1970	51,950,995	493,804	–	2,516,126	193,682	20,205	1,799,184	53,375,628	1,424,633	60,289,373
1971	53,375,628	983,556	–	2,280,205	775,506	65	1,953,104	55,461,850	2,086,222	61,964,760
1972	55,461,850	(2,004,125)	–	1,243,897	487,538	(5,580)	2,247,798	52,935,782	(2,526,068)	60,546,769
1973	52,935,782	(167,054)	–	1,257,243	686,714	70,097	2,325,350	52,457,432	(478,350)	60,801,068

a Includes proved reserves.
( ) Denotes negative volume.

Source: A.G.A., American Petroleum Institute and Canadian Petroleum Association. *Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the U.S.A. and Canada*, 1973.

(Source 17)

World Natural Gas Production, 1973



TOTAL GROSS PRODUCTION: 55 Trillion Cubic Feet
TOTAL MARKETED PRODUCTION: 44.4 Trillion Cubic Feet

(Source 9)

EXPORTS OF NATURAL GAS FROM THE UNITED STATES, 1950-1973

(Millions of cubic feet)

Year	Total	Canada	Mexico
1950	25,727	3,170	22,557
1955	31,029	11,467	19,562
1960	11,332	5,759	5,573
1965	26,132	17,979	8,153
1966	25,179	20,821	4,358
1967	81,614	70,456	11,158
1968	93,745	81,648	12,097
1969	51,304[a]	34,931	13,391
1970	69,013[a]	10,878	14,678
1971	80,365[a]	14,349	15,785
1972	78,013[a]	15,553	14,578
1973	77,169[a]	14,824	13,999

a. Includes 2,982 MMCF from Alaska to Japan (LNG) in 1969; 44,275 MMCF in 1970; 50,231 MMCF in 1971; 47,882 MMCF in 1972, and 48,346 MMCF in 1973.

Source: U.S. Bureau of Mines. *Natural Gas Annual*, 1973.

IMPORTS OF NATURAL GAS INTO THE UNITED STATES, 1950-1973

(Millions of cubic feet)

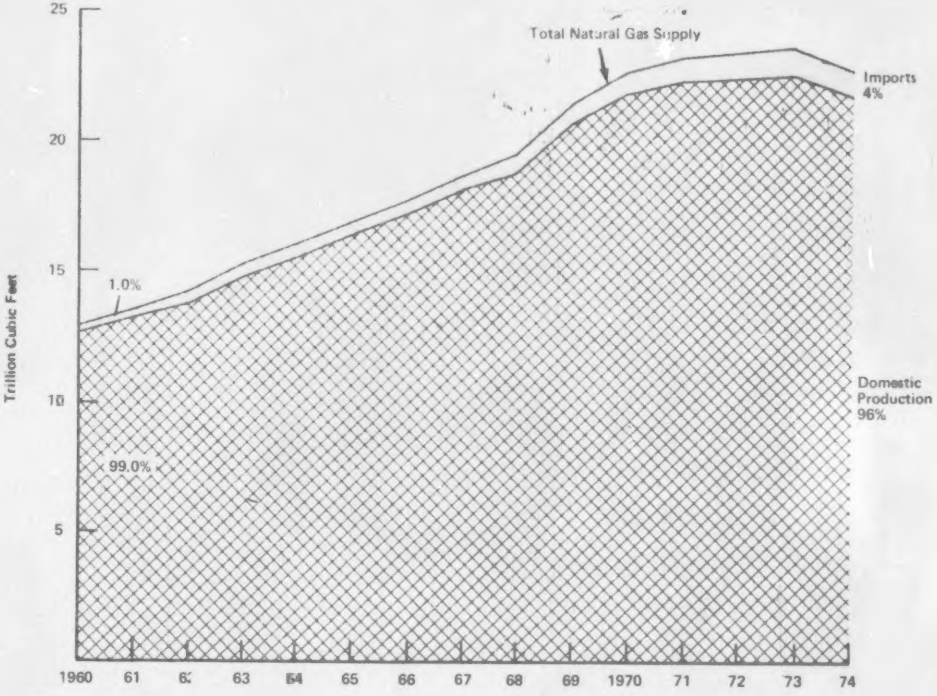
Year	Total	Canada	Mexico
1950	0	0	0
1955	10,888	10,881	7
1960	155,646	108,657	46,989
1965	456,394	[illegible]	51,708
1966	479,780	430,189	49,591
1967	564,226	513,255	50,971
1968	651,885	604,462	47,423
1969	726,951	[illegible]	46,845
1970	820,780[a]	778,687	41,336
1971	927,390[a]	903,772	20,689
1972	1,019,496[a]	1,009,093	8,141
1973	1,032,901[a]	1,027,214	1,632

a. Includes LNG imports of 787 MMCF into Massachusetts in 1970; 2,933 MMCF in 1971; 2,262 MMCF in 1972, and 4,055 MMCF in 1973.

Source: U.S. Bureau of Mines. *Natural Gas Annual*, 1973.

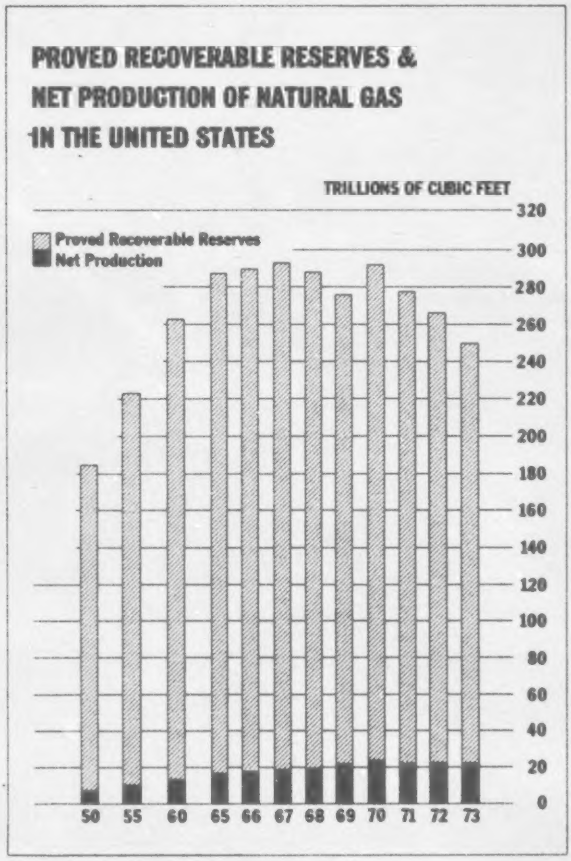
(Source 17)

U.S. Natural Gas Supply, 1960-74



UNITED STATES RESERVES

(Source 9)



PROVED RECOVERABLE RESERVES & NET PRODUCTION OF NATURAL GAS IN THE UNITED STATES

(Source 6)

U.S. PROVED RESERVES OF NATURAL GAS, AS OF DECEMBER 31
(MILLIONS OF CUBIC FEET – 14.73 PSIA, AT 60° F.)

Year	Revisions	Extensions	New Field Discoveries	New Reservoir Discoveries in Old Fields	Total of Discoveries, Revisions and Extensions	Production[1]	Proved Reserves (excluding underground storage) at End of Year	Under-ground Storage at End of Year	Proved Reserves Plus Underground Storage at End of Year
TOTAL NATURAL GAS									
1964	13,342,838		6,909,301		20,252,139	15,347,028	278,311,691	2,939,763	281,251,454
1965[a]	14,775,570		6,543,709		21,319,279	16,252,293	283,378,677	3,090,246	286,468,923
1966	4,937,962	9,224,745	2,947,329	3,110,396	20,220,432	17,491,073	286,108,036	3,224,769	289,332,805
1967	6,570,578	9,538,584	3,170,520	2,524,651	21,804,333	18,380,838	289,531,531	3,376,172	292,907,703
1968	3,016,146	7,758,821	1,376,429	1,545,612	13,697,008	19,373,427	283,855,112	3,494,740	287,349,852
1969	(1,238,261)	5,800,489	1,769,557	2,043,219	8,375,004	20,723,190	271,506,926	3,601,909	275,108,835
1970	(99,721)	6,158,168	27,770,223	3,367,689	37,196,359	21,960,804	286,742,481	4,003,927	290,746,408
1971	(1,227,400)	6,374,706	1,317,574	3,360,541	9,825,421	22,076,512	274,491,390	4,314,228	278,805,618
1972	(1,077,791)	6,153,683	1,462,539	3,096,132	9,634,563	22,511,898	261,614,055	4,470,791	266,084,846
1973	(3,474,756)	6,177,286	2,152,151	1,970,368	6,825,049	22,605,406	245,833,698	4,116,509	249,950,207
NON-ASSOCIATED NATURAL GAS									
1965	b	b	b	b	b	b	213,315,274		
1966	3,502,268	7,940,746	2,818,222	2,775,360	17,036,596	12,925,701	217,426,169		
1967	4,032,462	8,660,273	3,044,635	2,226,298	17,963,668	13,638,562	221,751,275		
1968	4,838,628	6,564,521	1,228,628	1,347,600	13,979,377	14,739,944	220,990,299		
1969	(1,460,196)	4,788,627	1,663,266	1,863,021	6,854,718	15,971,735	211,873,282		
1970	(301,054)	4,886,132	1,556,494	3,198,724	9,340,296	17,115,026	204,098,552		
1971	(1,119,410)	5,625,841	1,176,939	3,234,033	8,917,403	17,062,338	195,953,617		
1972	(1,696,284)	5,449,052	1,264,756	2,794,559	7,812,083	17,693,057	186,072,643		
1973	(5,321,156)	5,551,857	1,968,520	1,789,574	3,988,795	17,815,500	172,245,938		
ASSOCIATED-DISSOLVED NATURAL GAS									
1965	b	b	b	b	b	b	70,063,403		
1966	1,435,694	1,283,999	129,107	335,036	3,183,836	4,565,372	68,681,867		
1967	2,538,116	878,311	125,885	298,353	3,840,665	4,742,276	67,780,256		
1968	(1,822,482)	1,194,300	148,210	198,012	(281,960)	4,633,483	62,864,813		
1969	221,935	1,011,861	106,292	180,198	1,520,286	4,751,455	59,633,644		
1970	201,333	1,272,036	26,213,729	168,965	27,856,063	4,845,778	82,643,929		
1971	(107,990)	748,865	140,635	126,508	908,018	5,014,174	78,537,773		
1972	618,493	704,631	197,783	301,573	1,822,480	4,818,841	75,541,412		
1973	1,846,400	625,429	183,631	180,794	2,836,254	4,789,906	73,587,760		

[a] Separation of revisions from extensions and of new field discoveries from new reservoirs discovered in old fields not available prior to 1966.

[b] Not available prior to 1966.

[1] Preliminary net production.

( ) Denotes negative volume.

Source: American Gas Association, *Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada and United States Productive Capacity*, Annual.

(Source 9)

SUMMARY OF ANNUAL ESTIMATES OF NATURAL GAS RESERVES, 1950-1973

Note: Volumes are calculated at a pressure base of 14.73 psi, absolute, and at a standard temperature of 60° F.

(Millions of cubic feet)

	Natural Gas added during year										
Year	Extensions	Extensions and Revisions	Revisions	New Field Discoveries	Discoveries of New Fields and New Pools in Old Fields	New Reservoir Discoveries	Total of Discoveries, Revisions and Extensions	Net Change in Underground Storage	Preliminary Net Production during Year	Estimated Proved Reserves as of End of Year	Increase over Previous Year
1950	–	9,123,637	–	–	2,861,720	–	11,985,361	52,935	6,855,244	184,584,745	5,183,052
1951	–	12,942,930	–	–	3,022,878	–	15,965,808	132,030	7,923,673	192,758,910	8,174,165
1952	–	8,885,950	–	–	5,381,656	–	14,267,606	197,766	8,592,716	198,631,566	5,872,656
1953	–	13,298,733	–	–	7,043,200	–	20,341,933	113,629	9,188,365	210,298,763	11,667,197
1954	–	4,607,155	–	–	4,939,919	–	9,547,074	90,408	9,375,314	210,560,931	262,168
1955	–	16,209,607	–	–	5,688,009	–	21,897,616	87,164	10,063,167	222,482,544	11,921,613
1956	–	19,110,251	–	–	5,605,864	–	24,716,115	133,241	10,848,685	236,483,215	14,000,671
1957	–	11,057,932	–	–	8,950,119	–	20,008,051	178,761	11,439,890	245,230,137	8,746,922
1958	–	13,316,100	–	–	5,580,624	–	18,896,724	57,582	11,422,651	252,761,792	7,531,655
1959	–	14,852,004	–	–	5,769,245	–	20,621,249	160,453	12,373,063	261,170,431	8,408,639
1960	–	7,293,015	–	–	6,600,963	–	13,893,978	281,273	13,019,356	262,326,326	1,155,895
1961	–	10,258,692	–	–	6,907,729	–	17,166,421	159,544	13,378,649	266,273,642	3,947,316
1962	–	13,184,794	–	–	6,299,164	–	19,483,958	150,231	13,637,973	272,278,858	6,005,216
1963	–	12,586,733	–	–	5,577,934	–	18,164,667	253,733	14,546,025	276,151,233	3,872,375
1964	–	13,342,838	–	–	6,909,301	–	20,252,139	195,110	15,347,028	281,251,454	5,100,221
1965	–	14,775,570	–	–	6,543,709	–	21,319,279	150,483	16,252,293	286,468,923	5,217,469
1966	9,224,961	–	4,937,963	2,947,329	–	3,110,396	20,220,432	134,523	17,491,073	289,332,805	2,863,882
1967	9,530,584	–	6,570,378	3,178,520	–	2,524,851	21,804,333	181,403	18,380,838	292,907,703	3,574,898
1968	7,758,821	–	3,016,146	1,376,429	–	1,545,612	13,697,008	118,569	19,373,428	287,349,852	(5,557,851)
1969	5,800,489	–	(1,238,261)	1,769,557	–	2,043,219	8,375,004	107,169	20,723,190	275,108,835	(12,241,017)
1970	6,159,168	–	(99,721)	27,770,223	–	3,367,689	37,196,359	402,018	21,960,804	290,746,408	15,637,573
1971	5,374,706	–	(1,227,400)	1,317,574	–	3,360,541	8,825,421	310,301	22,076,512	278,805,618	(11,940,790)
1972	6,153,633	–	(1,077,791)	1,462,539	–	3,096,132	9,634,563	156,565	22,511,898	266,084,846	(12,720,772)
1973	6,177,286	–	(3,474,756)	2,152,151	–	1,970,368	6,825,049	(354,283)	22,005,406	249,950,207	(16,134,639)

( ): Denotes negative volumes.

Source: A.G.A., American Petroleum Institute and Canadian Petroleum Association. *Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the U.S.A. and Canada,* 1973.

(Source 9)

SUMMARY OF ANNUAL ESTIMATES OF NATURAL GAS LIQUIDS RESERVES, 1950-1973

Note: Includes condensate, natural gasoline and liquefied petroleum gases.

(Thousands of barrels)

	Natural Gas Liquids added during year										
Year	Extensions	Extensions and Revisions	Revisions	New Field Discoveries	Discoveries of New Fields and New Pools in Old Fields	New Reservoir Discoveries	Total of Discoveries, Revisions and Extensions	Preliminary Net Production during Year	Estimated Proved Reserves as of End of Year	Increase over Previous Year
1950	–	707,879	–	–	58,183	–	756,062	227,411	4,267,663	538,651
1951	–	648,497	–	–	75,494	–	723,991	267,052	4,724,602	456,939
1952	–	475,170	–	–	81,668	–	556,838	284,789	4,996,651	272,049
1953	–	648,047	–	–	95,922	–	743,969	302,698	5,437,922	441,271
1954	–	20,830	–	–	86,520	–	107,350	300,815	5,244,457	(193,465)
1955	–	447,160	–	–	67,348	–	514,508	320,400	5,438,565	194,108
1956	–	715,764	–	–	94,056	–	809,820	346,053	5,902,332	463,767
1957	–	8,884	–	–	128,508	–	137,392	352,364	5,687,360	(214,972)
1958	–	749,956	–	–	108,250	–	858,206	341,548	6,204,018	516,658
1959	–	593,905	–	–	109,539	–	703,444	385,154	6,522,308	318,290
1960	–	603,621	–	–	121,509	–	725,130	431,379	6,816,059	293,751
1961	–	590,537	–	–	104,149	–	694,686	461,649	7,049,096	233,037
1962	–	580,570	–	–	151,979	–	732,549	470,128	7,311,517	262,421
1963	–	700,183	–	–	177,937	–	878,120	515,659	7,673,978	362,461
1964	–	457,702	–	–	151,042	–	608,744	536,090	7,746,632	72,654
1965	–	721,605	–	–	110,707	–	832,312	555,410	8,023,534	276,902
1966	131,583	–	634,233	53,378	–	74,922	894,116	588,684	8,328,966	305,432
1967	159,725	–	671,112	57,272	–	41,649	929,758	644,493	8,614,231	285,265
1968	155,940	–	469,689	26,642	–	33,388	685,659	701,782	8,598,108	(16,123)
1969	106,815	–	106,192	26,831	–	41,190	281,028	735,962	8,143,174	(454,934)
1970	103,740	–	35,446	34,234	–	134,159	307,579	747,812	7,702,941	(440,233)
1971	93,909	–	135,144	28,513	–	90,154	347,720	746,434	7,304,227	(398,714)
1972	112,537	–	38,796	32,652	–	54,288	238,273	755,941	6,786,559	(517,668)
1973	121,835	–	231,460	19,202	–	36,482	408,979	740,831	6,454,707	(331,852)

( ): Denotes negative volumes.

Source: A.G.A., American Petroleum Institute and Canadian Petroleum Association. *Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the U.S.A. and Canada,* 1973.

(Source 16)

Estimated total proved reserves of natural gas in the United States

(Millions of Cubic Feet—14.73 psia, at 60° F.)

(Source: American Petroleum Institute—American Gas Association Joint Report, Vol. 28, June 1974)

State	Reserves as of 12/31/72	Reserves as of December 31, 1973				Percent Change
		Total Gas	Non-Associated	Associated-Dissolved	Underground Storage‡	
Alabama	**245,714**	**327,375**	**309,338**	**18,037**	**0**	**+33**
Alaska	**31,455,443**	**31,642,626**	**5,210,166**	**26,432,460**	**0**	**+ 0.6**
Arkansas	**2,455,877**	**2,269,353**	**2,082,558**	**152,294**	**34,501**	**− 8**
California*	**5,328,862**	**5,199,837**	**2,380,028**	**2,540,137**	**279,672**	**− 2**
San Joaquin Basin	4,073,942	4,075,907	2,299,263	[illegible]	103,940	+ 0.05
Coastal Region*	761,580	684,922	77,795	[illegible]	129,606	−10
Los Angeles Basin*	493,340	439,008	2,970	[illegible]	46,126	−11
Colorado	**1,655,200**	**1,868,299**	**1,592,362**	**250,904**	**25,033**	**+13**
Florida	**180,629**	**148,914**	**0**	**148,914**	**0**	**−18**
Illinois	**545,361**	**380,525**	**1,103**	**24,195**	**355,227**	**−30**
Indiana	**87,324**	**66,682**	**2,178**	**3,789**	**60,715**	**−24**
Kansas	**11,938,716**	**11,722,395**	**11,411,765**	**203,533**	**107,097**	**− 2**
Kentucky	**938,082**	**864,921**	**709,030**	**43,187**	**112,704**	**− 8**
Louisiana*	**74,971,334**	**69,151,613**	**57,239,668**	**11,732,832**	**179,113**	**− 8**
North	3,320,328	2,976,133	1,796,468	1,015,636	164,029	−10
South*	71,651,006	66,175,480	55,443,200	10,717,196	15,084	− 8
Michigan	**1,296,815**	**1,548,508**	**492,825**	**431,086**	**624,597**	**+19**
Mississippi	**1,104,336**	**1,178,218**	**968,414**	**120,711**	**89,093**	**+ 7**
Montana	**1,064,036**	**1,092,449**	**821,513**	**85,625**	**185,311**	**+ 3**
Nebraska	**50,260**	**48,816**	**13,779**	**8,795**	**26,242**	**− 3**
New Mexico	**12,335,647**	**12,488,363**	**9,814,816**	**2,657,246**	**16,301**	**+ 1**
Northwest	8,160,874	7,985,386	7,907,504	76,847	1,035	− 2
South	4,174,773	4,502,977	1,907,312	2,580,399	15,266	+ 8
New York	**139,184**	**136,842**	**31,972**	**70**	**104,800**	**− 2**
North Dakota	**441,625**	**448,184**	**6,372**	**441,812**	**0**	**+ 1**
Ohio	**1,146,677**	**1,179,391**	**649,260**	**159,383**	**370,748**	**+ 3**
Oklahoma	**14,492,030**	**14,098,735**	**11,183,035**	**2,675,836**	**239,864**	**− 3**
Pennsylvania	**1,406,948**	**1,494,381**	**876,818**	**12,050**	**605,513**	**+ 6**
Texas*	**95,042,043**	**84,936,502**	**60,530,423**	**24,268,979**	**137,100**	**−11**
District 1	1,620,405	1,473,201	1,176,016	296,752	433	− 9
District 2	9,496,136	8,449,920	6,138,140	2,311,143	637	−11
District 3*	20,696,874	18,526,171	12,621,973	5,841,160	63,038	−10
District 4*	24,334,110	19,416,215	13,791,775	5,624,440	0	−20
District 5	1,171,395	1,149,781	959,316	158,824	31,641	− 2
District 6	5,710,441	5,432,193	3,718,953	1,713,240	0	− 5
District 7B	663,560	652,076	263,221	364,051	27,804	− 2
District 7C	2,581,980	2,430,873	1,633,022	795,924	1,927	− 6
District 8	15,481,337	14,796,454	10,428,998	4,367,456	0	− 4
District 8A	2,366,951	2,121,505	85,268	2,036,237	0	−10
District 9	1,559,594	1,502,193	1,100,665	389,908	11,620	− 4
District 10	9,359,260	8,985,920	8,616,076	369,844	0	− 4
Utah	**1,022,110**	**1,024,723**	**541,376**	**481,697**	**1,650**	**+ 0.3**
Virginia	**35,921**	**37,273**	**37,273**	**0**	**0**	**+ 4**
West Virginia	**2,345,957**	**2,319,828**	**1,912,318**	**52,319**	**355,191**	**− 1**
Wyoming	**4,088,728**	**4,109,523**	**3,413,115**	**641,032**	**55,376**	**+ 0.5**
Miscellaneous†	**269,987**	**165,931**	**14,433**	**837**	**150,661**	**−39**
Total United States	**266,084,846**	**249,950,207**	**172,245,938**	**73,587,760**	**4,116,509**	**− 6.1**

---

* Includes offshore reserves.

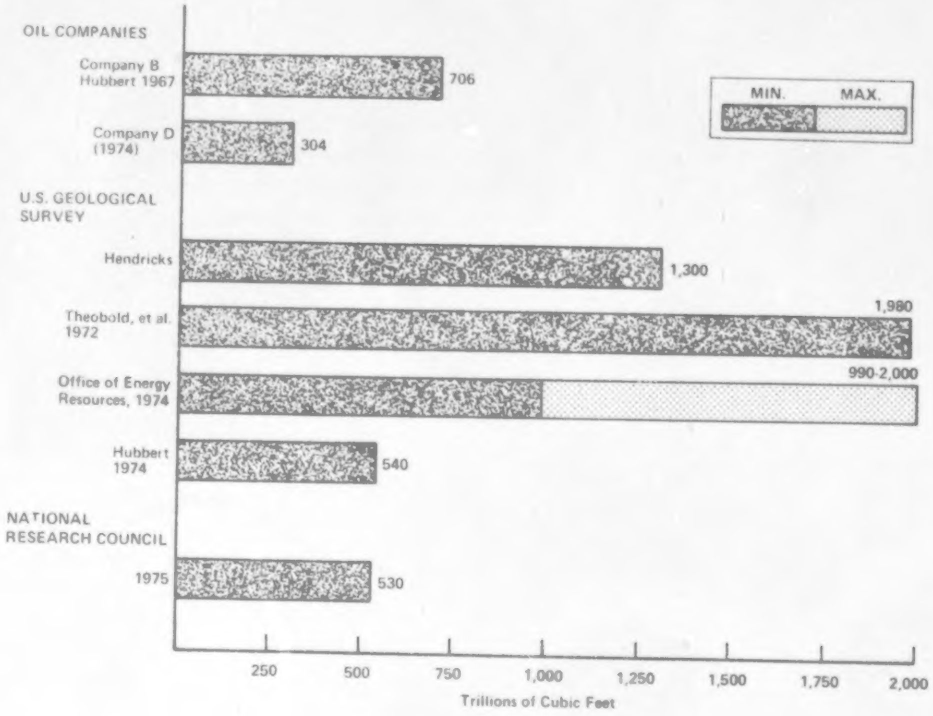
The remaining proved natural gas reserves in the Gulf of Mexico are estimated to be 36,785,308 MMcf; of which 32,092,008 MMcf are non-associated, and 4,693,300 MMcf are associated-dissolved. As of this date the ultimate recoverable natural gas reserves in the Gulf of Mexico are estimated to be 64,828,706 MMcf; of which 55,133,639 MMcf are non-associated, and 9,695,067 MMcf are associated-dissolved.

† Includes Arizona, Iowa, Maryland, Minnesota, Missouri, South Dakota, Tennessee and Washington.

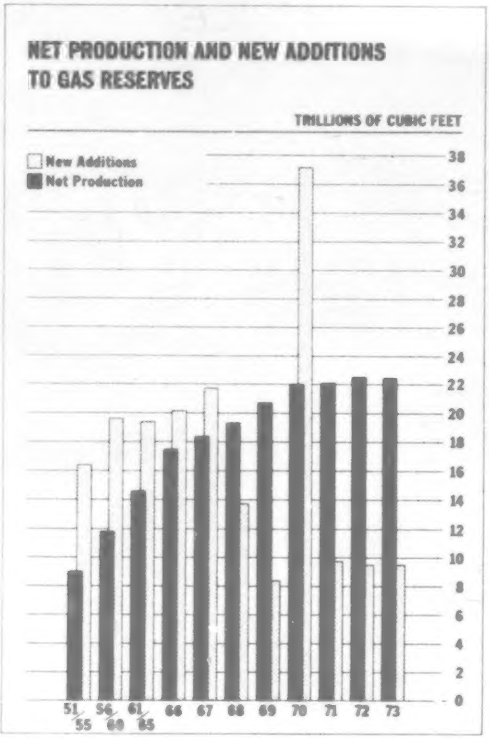
‡ Gas held in underground reservoirs (including native and net injected gas) for storage purposes.

(Source 17)

Alternative Estimates of U.S. Undiscovered Natural Gas Resources



(Source 9)


NET PRODUCTION AND NEW ADDITIONS TO GAS RESERVES
TRILLIONS OF CUBIC FEET
☐ New Additions
■ Net Production
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
51/55
56/60
61/65
66
67
68
69
70
71
72
73

UNITED STATES PRODUCTION

(Source 16)

U.S. wells producing gas at end of 1974

STATE or DISTRICT	Total gas & gas-distillate wells
Alabama	31
Alaska	52
Arizona	4
Arkansas	1,142
California	1,012
Colorado	1,039
Illinois	43
Indiana	474
Kansas*	9,000
Kentucky	7,307
Louisiana	11,148
North Louisiana	5,069
South Louisiana	3,919
Offshore Louisiana	2,160
Maryland	14
Michigan	365
Mississippi	231
Missouri	3
Montana	1,184
Nebraska	23
New Mexico	9,840
Southeast N. M.	1,488
Northwest N. M.	8,352
New York	800
North Dakota	20
Ohio	9,826
Oklahoma	9,367
Pennsylvania	17,100
Tennessee	10
Texas	24,324
Districts	
1: S. Central	477
2: Middle Gulf	2,092
3: Upper Gulf	2,456
4: Lower Gulf-S.W.	4,027
5: E. Central	397
6: Northeast	1,616
7-B: N. Central	1,187
7-C: W. Central	1,489
8: West	2,149
9: North	1,472
10: Panhandle	6,962
Utah	114
Virginia	174
West Virginia	21,450
Wyoming*	900
Total U. S., 1974	126,997
Total U. S., 1973	123,034

* Estimate

(Source 9)

ESTIMATED GROSS PRODUCTION OF NATURAL GAS, BY STATE, 1955-1973

Note: Includes gas (mostly residue gas) blown to the air, but does not include direct waste on producing properties, except where data are available.

(Millions of cubic feet)

Division and State	1955	1965	1970	1972	1973
United States	11,719,794	17,963,100	23,786,453	24,016,109R	24,067,202
New England	0	0	0	0	0
Middle Atlantic	103,800	88,240	80,472	77,637	83,083
New Jersey	0	0	0	0	0
New York	4,000	3,340	3,358	3,679	4,539
Pennsylvania	99,800	84,900	77,114	73,958	78,514
East North Central	92,000	82,700	97,276	120,603	141,220
Illinois	40,400	7,500	4,972	3,000	1,638
Indiana	4,500	2,400	153	355	276
Michigan	12,100	36,900	40,038	35,253	45,696
Ohio	35,000	35,900	52,113	[illegible]	93,610
Wisconsin	0	0	0	0	0
West North Central	558,500	866,900	965,533	951,752R	952,238
Iowa	0	0	0	0	0
Kansas	525,000	806,800	904,475	893,736	897,289
Minnesota	0	0	0	a	0
Missouri	a	a	a	a	33
Nebraska	18,000	12,100	6,309	4,761	4,670
North Dakota	15,500	48,000	54,751	53,258R	50,236
South Dakota	0	a	a	a	10
South Atlantic	218,084	211,060	246,599	233,972	248,072
Delaware	0	0	0	a	0
District of Columbia	0	0	0	0	0
Florida	a	a	a	15,805	33,857
Georgia	0	0	0	0	0
Maryland	3,116	408	813	244	298
North Carolina	0	0	0	0	0
South Carolina	0	0	0	0	0
Virginia	968	3,152	2,805	2,787	5,101
West Virginia	214,000	207,500	242,981	215,136	208,816
East South Central	342,000	277,300	234,912	188,160	193,503
Alabama	a	a	a	4,610	13,161
Kentucky	76,000	79,100	77,892	63,648	62,396
Mississippi	266,000	198,200	157,020	[illegible]	117,761
Tennessee	a	a	a	[illegible]	185
West South Central	8,794,000	14,022,900	19,469,337	19,807,352	19,830,402
Arkansas	55,000	108,000	183,650	169,171	159,476
Louisiana	1,948,000	4,764,300	8,076,157	8,159,763	8,491,194
Oklahoma	955,000	1,414,000	1,811,004	1,927,949	1,889,787
Texas	5,836,000	7,740,600	9,398,526	9,550,469	9,289,945
Mountain	808,900	1,492,500	1,744,236	1,850,336	1,881,840
Arizona	a	a	a	809	402
Colorado	97,000	155,200	115,157	122,122	141,442
Idaho	0	0	0	0	0
Montana	29,000	29,800	48,302	38,117	[illegible]
Nevada	0	0	0	0	[illegible]
New Mexico	565,000	956,500	1,141,889	1,221,757	1,223,562
Utah	17,900	92,100	73,386	75,664	78,511
Wyoming	100,000	258,900	365,503	391,847	376,992
Pacific	802,000	917,800	945,099	778,297	736,874
Alaska	0	12,800	217,854	222,905	223,288
California	802,000	905,000	727,245	555,392	513,586
Hawaii	0	0	0	0	0
Oregon	0	0	0	0	0
Washington	0	0	0	0	0
Other States	510	3,700	2,987	0	0

a. Included in "other states."
Source: U.S. Bureau of Mines. *Natural Gas Annual*, 1973.
R - Revised.

(Source 9)

ESTIMATED NET PRODUCTION OF NATURAL GAS, BY STATE, 1955-1973

Note: Gross production less quantities repressured.

(Millions of cubic feet)

Division and State	1955	1965	1970	1972	1973
United States	10,178,990	16,358,896	22,410,102	22,779,817R	22,895,841
New England	0	0	0	0	0
Middle Atlantic	103,653	87,842	80,199	77,637	83,053
New Jersey	0	0	0	0	0
New York	4,000	3,340	3,358	3,679	4,539
Pennsylvania	99,653	84,502	76,841	73,958	78,514
East North Central	89,101	80,800	96,898	128,603	141,220
Illinois	39,763	7,500	4,972	3,000	1,638
Indiana	4,463	2,400	153	355	276
Michigan	9,930	35,000	39,660	35,253	45,696
Ohio	34,945	35,900	52,113	89,995	93,610
Wisconsin	0	0	0	0	0
West North Central	555,971	860,204	963,410	949,957R	950,434
Iowa	0	0	0	0	0
Kansas	522,826	806,683	902,668	891,949	895,495
Minnesota	0	0	0	0	0
Missouri	a	a	a	9	33
Nebraska	17,645	11,985	5,991	4,741	4,670
North Dakota	15,500	41,536	54,751	53,258R	50,236
South Dakota	0	a	a	0	0
South Atlantic	217,968	211,044	246,070	233,787	247,932
Delaware	0	0	0	0	0
District of Columbia	0	0	0	0	0
Florida	a	a	a	15,805	33,857
Georgia	0	a	0	0	0
Maryland	3,116	408	813	244	298
North Carolina	0	0	0	0	0
South Carolina	0	a	0	0	0
Virginia	968	3,152	2,805	2,787	5,101
West Virginia	213,884	207,484	242,452	214,951	208,676
East South Central	279,323	255,601	211,156	176,126	186,215
Alabama	a	a	a	4,618	13,161
Kentucky	75,921	79,100	77,892	63,648	62,396
Mississippi	203,402	176,501	133,264	107,861	110,473
Tennessee	a	a	a	[illegible]	185
West South Central	7,614,965	12,769,359	18,306,535	18,768,861	18,861,364
Arkansas	38,351	83,845	181,577	169,171	159,476
Louisiana	1,746,236	4,589,349	7,942,365	8,036,345	8,344,514
Oklahoma	829,055	1,356,738	1,724,572	1,845,684	1,807,391
Texas	5,001,323	6,739,427	8,458,021	8,717,661	8,549,983
Mountain	770,995	1,416,853	1,705,299	1,810,384	1,838,269
Arizona	a	a	a	809	402
Colorado	68,863	131,342	112,930	121,707	140,733
Idaho	0	0	0	0	0
Montana	28,873	29,221	47,908	37,696	59,866
Nevada	0	0	a	a	0
New Mexico	562,227	945,794	1,141,889	1,221,757	1,222,540
Utah	17,900	72,306	45,633	44,980	50,379
Wyoming	93,132	238,190	356,939	383,435	364,349
Pacific	546,504	673,493	798,000	634,464	587,354
Alaska	0	7,331	146,384	147,186	135,986
California	546,504	666,162	651,616	487,278	451,368
Hawaii	0	a	0	0	0
Oregon	0	0	0	0	0
Washington	0	0	0	0	0
Other States	510	3,700	2,535	0	0

a. Included in "other states."
Source: U.S. Bureau of Mines. *Natural Gas Annual*, 1973.
R - Revised.

(Source 9)

NUMBER OF PRODUCING GAS WELLS, BY STATE, 1950-1973

Note: Data pertain only to dry gas and condensate wells. Data as of December 31.

Division and State	1950	1955	1960	1965	1970	1972	1973
United States	64,900	71,475	90,761	111,680	118,864	119,167	123,034
New England	0	0	0	0	0	0	0
Middle Atlantic	19,900	17,480	17,350	[illegible]	16,944	17,350	17,325
New Jersey	0	0	0	0	0	0	0
New York	1,400	1,180	1,000	1,150	705	700	725
Pennsylvania	18,500	16,300	16,350	17,516	16,239	16,650	16,600
East North Central	8,190	6,890	7,612	7,626	8,157	9,004	9,801
Illinois	90	30	45	25	10	30	36
Indiana	750	400	350	275	87	87	106
Michigan	550	260	154	226	271	248	253
Ohio	6,800	6,200	7,063	7,100	7,789	8,639	9,406
Wisconsin	0	0	0	0	0	0	0
West North Central	3,759	5,132	6,093	7,281	8,646	8,750	8,860
Iowa	0	0	0	0	0	0	0
Kansas	3,700	5,100	6,003	7,200	8,567	8,685	8,785
Minnesota	0	0	0	0	0	0	0
Missouri	59a	32a	9	11	11	1	2
Nebraska	a	a	53	39	35	28	29
North Dakota	b	b	28	31	33	36	44
South Dakota	b	b	0	0	0	0	0
South Atlantic	13,900	14,000	14,630	19,719	20,833	21,258	21,415
Delaware	0	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0	0
Florida	0	0	0	0	0	0	0
Georgia	0	0	0	0	0	0	0
Maryland	0	b	38	20	16	15c	15
North Carolina	0	0	0	0	0	0	0
South Carolina	0	0	0	0	0	0	0
Virginia	b	b	92	99	115	143c	0
West Virginia	13,900	14,000	14,500	19,600	20,702	21,100	21,400
East South Central	3,658	4,358	5,263	6,490	7,254	7,435	7,495
Alabama	b	b	4	0	1	16	15
Kentucky	3,500	4,100	4,829	6,100	6,913	7,099	7,224
Mississippi	140	230	400	370	325	307	250
Tennessee	18	28	30	20	15	13	6
West South Central	13,629	19,440	31,261	40,502	43,937	42,379	44,100
Arkansas	179	240	370	744	702	947	876
Louisiana	2,550	3,600	6,479	8,563	10,343	9,619	10,551
Oklahoma	3,600	4,200	5,800	7,447	8,557	8,453	8,868
Texas	7,300	11,400	18,612	23,748	24,335	23,360	23,805
Mountain	1,381	3,580	7,898	10,352	12,064	11,991	12,891
Arizona	0	0	1	8	14	4c	4
Colorado	36	100	466	701	861	934	1,050
Idaho	0	0	0	0	0	0	0
Montana	820	1,060	999	784	1,318	871	1,118
Nevada	0	0	0	0	0	0	0
New Mexico	360	2,200	6,047	8,010	8,893	9,288	9,711
Utah	b	b	35	148	178	194	158
Wyoming	165	220	350	701	800	700	850
Pacific	440	470	654	1,044	1,029	1,000	1,147
Alaska	0	0	2	11	49	49	52
California	440	470	652	1,033	980	951	1,095
Hawaii	0	0	0	0	0	0	0
Oregon	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0
Other States	43	125	0	0	0	0	0

a. Nebraska included in Missouri.
b. Either none or included in "other states."
c. Estimated.
Source: U.S. Bureau of Mines, The American Association of Petroleum Geologists and American Petroleum Institute. *World Oil*, February 15, 1974.

(Source 6)

NUMBER OF PRODUCING NATURAL GAS WELLS ON DECEMBER 31, BY STATES

	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Alabama	–	–	–	–	1	1	2	–	15	15
Alaska	13	11	19	21	18	44	51	40	50	52
Arizona	10	8	9	7	4	4	4	5	4	4
Arkansas	515	744	818	909	947	998	1,008	1,013	1,041	876
California	950	1,033	1,068	1,059	994	897	980	962	1,086	1,095
Colorado	560	701	826	827	810	805	861	928	934	1,050
Illinois	25	25	3	3	5	5	8	14	31	36
Indiana	280	275	275	271	265	263	50	83	87	106
Kansas	7,174	7,200	8,608	8,603	8,509	8,567	8,660	8,585	8,621	8,785
Kentucky	5,320	6,100	6,020	6,215	6,290	6,413	6,913	7,413	7,099	7,224
Louisiana	8,260	8,563	8,977	9,036	9,163	9,354	9,690	9,748	9,456	10,551
Maryland	16	20	8	13	15	13	16	14	16	15
Michigan	195	226	250	244	199	211	1,235	1,171	1,317	1,145
Mississippi	435	370	376	360	347	322	325	400	252	250
Missouri	6	11	11	11	11	11	11	2	3	2
Montana	869	784	784	648	1,196	1,098	739	1,056	1,116	1,118
Nebraska	41	39	37	37	36	35	35	29	29	29
New Mexico	7,306	8,010	8,017	8,274	8,754	9,100	8,848	9,388	9,679	9,711
New York	1,155	1,150	1,164	1,159	1,155	818	600	600	650	789
North Dakota	31	31	31	31	19	33	29	29	21	44
Ohio	7,160	7,100	3,790	3,865	7,211	7,334	7,789	8,179	8,630	9,406
Oklahoma	6,813	7,447	7,841	7,726	8,337	8,432	8,168	8,507	8,457	8,868
Pennsylvania	14,120	17,516	17,808	17,700	17,000	16,600	16,239	16,586	16,600	16,600
Tennessee	30	20	20	21	23	26	15	20	45	6
Texas	22,995	23,748	23,907	23,760	23,805	23,689	23,417	23,280	23,373	23,805
Utah	135	148	156	168	165	171	173	178	200	158
Virginia	100	99	104	104	111	111	115	115	130	178
West Virginia	17,960	19,600	20,830	20,500	18,214	18,600	20,702	21,025	21,324	21,400
Wyoming	610	701	741	749	787	521	800	840	887	850
U. S. Total	103,084	111,680	112,498	112,321	114,391	114,476	117,483	120,210	121,153	124,168

Source: Bureau of Mines, *Minerals Yearbook*, Volume II.

(Source 9)

MARKETED PRODUCTION OF NATURAL GAS AND AVERAGE WELLHEAD PRICE 1950-1973

Note: Marketed production as reported by the Bureau of Mines is equivalent to natural gas production usefully consumed. It includes natural gas sold by producers and other non-utilities to industrial consumers and includes natural gas mixed with manufactured gas for consumption.

Year	Marketed Production Millions of cubic feet	 Trillions of Btu	Average Wellhead Price (cents per MCF)
1950	6,282,060	6,753.0	6.5
1951	7,457,359	8,016.7	7.3
1952	8,013,457	8,614.5	7.8
1953	8,396,916	9,026.7	9.2
1954	8,742,546	9,398.2	10.1
1955	9,405,351	10,110.4	10.4
1956	10,081,923	10,838.2	10.8
1957	10,680,258	11,481.0	11.3
1958	11,030,248	11,857.5	11.9
1959	12,046,115	12,949.5	12.9
1960	12,771,038	13,728.8	14.0
1961	13,254,025	14,248.1	15.1
1962	13,876,622	14,917.4	15.5
1963	14,746,663	15,852.7	15.8
1964	15,462,143	16,621.8	15.4
1965	16,039,753	17,242.7	15.6
1966	17,206,628	18,497.1	15.7
1967	18,171,325	19,534.2	16.0
1968	19,322,400	20,771.6	16.4
1969	20,698,240	22,250.6	16.7
1970	21,920,642	23,564.7	17.1
1971	22,493,012	24,190.0	18.2
1972	22,531,698	24,221.6	18.6
1973	22,647,549	24,346.1	21.6

Source: U.S. Bureau of Mines, *Natural Gas Annual*, 1973.

(Source 9)

PRODUCTION AND DISPOSITION OF NATURAL GAS IN THE UNITED STATES, 1950-1973

Note: Production data include allowance for natural gas liquids content in the natural gas, and therefore differ from totals developed by A.G.A. and included in Section d

(Millions of cubic feet)

Year	Production Gross[a] Gas Wells	 Oil Wells	 Total	 Repressuring	 Net	Disposition Losses and Waste[a]	 Marketed Production	 Field Use	 Net Change in Underground Storage	 Lost in Transmission	 Net Marketed Production
1950	5,603,200	2,876,450	8,479,650	1,396,546	7,083,104	801,044	6,282,060	1,187,473	54,492	175,437	4,864,658
1951	6,481,452	3,207,920	9,689,372	1,438,827	8,250,545	793,186	7,457,359	1,441,870	138,262	192,372	5,684,855
1952	6,839,177	3,433,389	10,272,566	1,410,501	8,862,065	848,608	8,013,457	1,483,754	176,684	203,646	6,149,373
1953	7,095,237	3,550,561	10,645,798	1,438,606	9,207,192	810,276	8,396,916	1,471,085	158,036	240,445	6,527,350
1954	7,466,007	3,518,843	10,984,850	1,518,737	9,466,113	723,567	8,742,546	1,456,883	102,106	215,709	6,967,848
1955	7,841,958	3,877,836	11,719,794	1,540,804	10,178,990	773,639	9,405,351	1,507,671	67,934	246,933	7,582,813
1956	8,306,550	4,066,355	12,372,905	1,426,648	10,946,257	864,334	10,081,923	1,420,550	136,470	212,992	8,311,911
1957	8,716,835	4,189,834	12,906,669	1,417,263	11,489,406	809,148	10,680,258	1,479,720	191,396	205,373	8,803,769
1958	9,154,051	3,992,584	13,146,635	1,482,975	11,663,660	633,412	11,030,248	1,604,104	83,081	283,597	9,059,466
1959	10,101,754	4,127,518	14,229,272	1,612,109	12,617,163	571,048	12,046,115	1,737,402	118,742	223,312	9,966,659
1960	10,853,426	4,234,485	15,087,911	1,753,996	13,333,915	562,877	12,771,038	1,779,671	131,694	274,231	10,585,442
1961	11,195,087	4,265,225	15,460,312	1,682,754	13,777,558	523,533	13,254,025	1,881,208	145,616	234,808	10,992,393
1962	11,702,382	4,336,591	16,038,973	1,736,722	14,302,251	425,629	13,876,622	1,993,128	86,487	285,726	11,511,281
1963	12,606,022	4,367,346	16,973,368	1,843,297	15,130,071	383,408	14,746,663	2,081,339	130,772	364,658	12,169,894
1964	13,035,200	4,405,100	17,440,300	1,638,161	15,802,139	339,996	15,462,143	2,082,029	128,804	302,781	12,948,529
1965	13,523,600	4,439,500	17,963,100	1,604,204	16,358,896	319,143	16,039,753	1,909,697	118,115	318,711	13,693,230
1966	13,893,921	5,139,918	19,033,839	1,451,516	17,582,323	375,695	17,206,628	1,772,708	68,855	401,203	14,963,862
1967	15,346,853	4,904,923	20,251,776	1,590,574	18,661,202	489,877	18,171,325	1,925,500[b]	184,829	296,214	15,764,782
1968	16,539,925	4,785,075	21,325,000	1,486,092	19,838,908	516,508	19,322,400	2,065,008[b]	95,539	325,062	16,836,791
1969	17,489,415	5,189,780	22,679,195	1,455,205	21,223,990	525,750	20,698,240	2,212,208[b]	119,500	331,587	18,034,945
1970	18,594,658	5,191,795	23,786,453	1,376,351	22,410,102	489,460	21,920,642	2,305,171[b]	398,160	227,650	18,989,661
1971	18,925,136	5,162,895	24,088,031	1,310,458	22,777,573	284,561	22,493,012	2,296,777[b]	331,768	338,999	19,525,468
1972	19,042,592R	4,973,517R	24,016,109R	1,236,292	22,779,817R	248,119R	22,531,698	2,363,556[b]	135,734	328,002	19,704,406
1973	19,371,600	4,695,602	24,067,202	1,171,361	22,895,841	248,292	22,647,569	2,412,466[b]	441,504	195,863	19,597,736

a Includes gas (mostly residue gas) blown to the air but does not include direct waste on producing properties, except where data are available.
b Beginning in 1967, computed by A.G.A. from "Extraction loss" and "Lease and plant fuel."
Source: U.S. Bureau of Mines, *Natural Gas Annual*, 1973.
R Revised.

(Source 9)

MARKETED PRODUCTION AND INTERSTATE SHIPMENTS OF NATURAL GAS, 1973

(Millions of cubic feet)

Division and State	Marketed Production	Interstate Movements	
		Receipts	Deliveries
United States	22,647,549	37,844,945a	36,899,213b
New England	0	439,544	182,621
Connecticut	0	151,382	87,523
Maine	0	14,275c	0
Massachusetts	0	181,232	23,211
New Hampshire	0	d	0
Rhode Island	0	92,655	71,889
Vermont	0	d	0
Middle Atlantic	83,053	3,772,070	2,000,453
New Jersey	0	779,068	474,736
New York	4,539	964,949	349,573
Pennsylvania	78,514	2,048,053	1,376,144
East North Central	140,103	8,720,807	4,598,745
Illinois	1,638	2,329,907	1,085,154
Indiana	276	2,047,305	1,487,347
Michigan	44,579	925,952	14,736
Ohio	93,610	2,978,272	1,929,823
Wisconsin	0	439,371	81,686
West North Central	924,690	7,887,218	5,878,295
Iowa	0	1,323,459	937,517
Kansas	893,118	2,079,963	2,314,562
Minnesota	0	804,282	246,767
Missouri	33	1,644,311	1,210,425
Nebraska	3,836	1,361,501	1,133,627
North Dakota	27,703	11,058	4,308
South Dakota	0	62,663	31,089
South Atlantic	247,932	7,006,984	5,657,282
Delaware	0	35,436	1,996
Dist. of Columbia	0	e	e
Florida	33,857	282,070	0
Georgia	0	1,388,683	1,044,611
Maryland	298	862,879f	657,919f
North Carolina	0	871,572	710,868
South Carolina	0	1,022,225	871,572
Virginia	5,101	1,008,381	854,454
West Virginia	208,676	1,543,718	1,515,862
East South Central	173,393	18,489,532	17,500,879
Alabama	11,271	3,157,465	2,898,432
Kentucky	62,396	4,193,000	3,979,588
Mississippi	99,706	6,636,027	6,420,802
Tennessee	20	4,503,040	4,202,057
West South Central	18,684,782	5,777,689	15,957,173
Arkansas	157,529	2,701,399	2,519,599
Louisiana	8,242,423	1,256,830	7,162,687
Oklahoma	1,770,980	1,268,128	2,333,024
Texas	8,513,850	551,332	3,941,863
Mountain	1,813,220	3,721,444	4,180,679
Arizona	125	1,533,942	1,318,062
Colorado	137,725	328,439	126,573
Idaho	0	524,831	469,131
Montana	56,175	84,751	46,280
Nevada	0	74,358	0
New Mexico	1,218,749	844,083	1,740,552
Utah	42,715	234,442	147,833
Wyoming	357,731	96,638	332,248
Pacific	580,376	2,831,659	933,083
Alaska	131,007	0	48,346
California	449,369	1,636,723	0
Hawaii	0	0	0
Oregon	0	[illegible]	382,264
Washington	0	704,335	502,473

a. Includes receipts from Canada of 437,857 million cubic feet into Idaho; 267,401 million cubic feet into Washington; 362,434 million cubic feet into Minnesota; 10,064 million cubic feet into Montana; 5,546 million cubic feet into New York; 3,912 million cubic feet into Vermont; and from Mexico 1,632 million cubic feet into Texas. LNG imports of 4,055 million cubic feet into Massachusetts.

b. Includes deliveries into Canada of 14,736 million cubic feet from Michigan, 88 million cubic feet from Montana; and into Mexico 9,522 million cubic feet from Texas, and 4,477 million cubic feet from Arizona. LNG exports of 48,346 million cubic feet from Alaska to Japan.

c. Includes New Hampshire and Vermont.

d. Included in Maine.

e. Included in Maryland.

f. Includes District of Columbia.

Source: U.S. Bureau of Mines, *Natural Gas Annual*, 1973.

UNITED STATES DEMAND

(Source 9)

INDUSTRIAL CONSUMPTION OF NATURAL GAS IN THE UNITED STATES, BY TYPE OF INDUSTRY, 1950-1973

Note: Industrial consumption as reported by the Bureau of Mines includes sales by non-utility producers and others, and natural gas mixed with manufactured gas. Hence quantities reported in this table substantially exceed those reported in Section VII, as utility industrial sales.

(Millions of cubic feet)

Year	Total	Field Use	Carbon Black Plants[c]	Petroleum Refineries	Portland Cement Plants	Used as Pipeline Fuel	Electric Public Utility Power Plants[a]	Other Industrial[a]
1950	4,440,197	1,187,473	410,852	455,096	96,986	125,546	628,919	1,338,328
1951	5,163,528	1,441,870	426,423	537,774	102,508	192,496	763,898	1,698,559
1952	5,475,863	1,483,754	368,399	536,402	111,479	207,207	910,117	1,858,485
1953	5,763,185	1,471,085	300,942	558,695	115,039	230,314	1,034,272	2,052,838
1954	5,923,647	1,456,883	251,170	563,315	125,257	230,615	1,165,498	2,130,903
1955	6,317,172	1,507,671	266,794	625,243	131,400	285,246	1,153,280	2,409,538
1956	6,662,443	1,420,550	242,598	679,343	144,192	295,972	1,239,311	2,640,477
1957	7,003,590	1,479,720	233,788	678,810	146,000	299,235	1,338,079	2,827,958
1958	7,174,623	1,604,104	211,048	681,912	164,000	312,221	1,372,853	2,828,485
1959	7,931,930	1,737,403	214,612	752,239	188,000	349,348	1,627,097	3,063,232
1960	8,306,038	1,779,671	197,628	775,154	171,000	347,075	1,724,763	3,390,747
1961	8,756,287	1,881,208	161,377	772,038	180,000	377,607	1,825,341	3,558,726
1962	9,204,898	1,993,128	133,302	789,877	188,000	382,496	1,965,590	3,752,505
1963	9,783,676	2,081,339	117,378	789,951	198,000	423,783	2,142,930	4,030,295
1964	10,327,458	2,082,029	115,626[c]	820,989	202,000	433,206	2,321,889	4,351,721
1965	10,709,017	1,909,697	115,576[c]	859,899	198,507	500,524	2,318,253	4,806,563
1966	11,434,494	1,772,708	114,936[c]	903,398	203,805	535,353	2,608,768	5,315,526
1967	12,167,932	1,938,500	108,961[c]	936,083	195,717	575,752	2,763,251	5,682,666
1968	13,208,942	2,065,000	104,973[c]	973,957	202,921	590,965	3,143,858	6,127,260
1969	14,239,996	2,312,288	98,251[c]	997,886	201,295	630,962	3,496,391	6,613,003
1970	15,151,793	2,305,171	85,884[c]	1,038,794	d	722,166	3,894,019	7,115,758
1971	15,532,192	2,296,777	63,699	1,062,938	d	742,592	3,992,983	7,373,203
1972	15,596,902	2,363,556	53,939	1,070,626	d	764,156	3,978,673	7,363,952
1973	15,798,486	2,412,466	49,683	1,073,742	d	728,177	3,605,333	7,929,086

a. Consumption by "Electric Public Utility Power Plants" includes small quantities of gas other than natural, impossible to segregate. To this extent consumption by other industrials is understated.
b. Included in "Other industrial" prior to 1950.
c. Data revised to include Natural Gas to enrich hydrocarbons, as of 1964.
d. Included in "Other Industrial".
Source: U.S. Bureau of Mines. *Natural Gas Annual*, 1973. (Consumption of "electric public utility power plants" as reported to the Bureau by the Federal Power Commission).

(Source 9)

TOTAL LIQUEFIED PETROLEUM GAS SALES IN LIQUID FORM TO ULTIMATE CONSUMERS, BY MAJOR USE, 1950-1972

(Thousands of gallons)

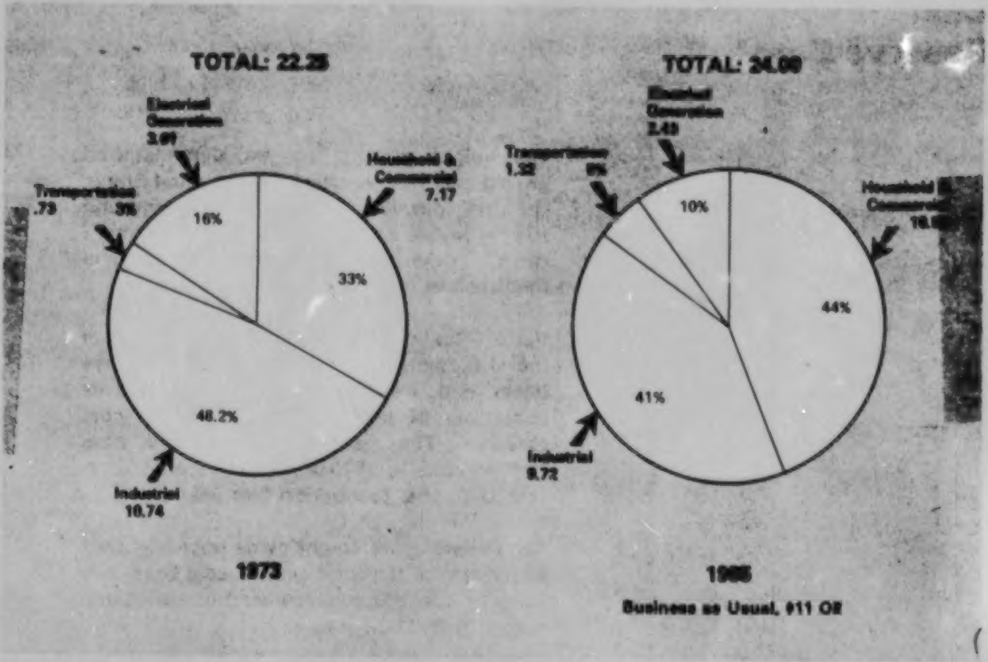
Year	Total	Gas Utility	Domestic and Commercial	Industrial	Refinery Fuel	Internal Combustion Engine Fuel	Chemical Manufacturing	Synthetic Rubber	Other
1950	3,402,967	251,694	2,034,464	217,070	a	129,818	612,468	228,465	8,960
1951	4,227,275	281,692	2,166,813	362,102	a	289,991	844,507	374,864	7,308
1952	4,677,379	259,697	2,306,178	324,967	a	370,558	870,990	370,997	13,992
1953	4,932,009	322,430	2,479,180	368,517	a	490,238	967,427	390,501	25,716
1954	5,125,533	191,932	2,636,888	375,121	a	567,206	1,050,239	387,735	36,494
1955	6,122,718	213,760	2,881,379	423,431	101,033	651,821	1,493,177	488,210	31,907
1956	6,635,763	212,293	3,001,021	638,916	162,598	773,471	1,688,688	618,101	48,767
1957	6,939,121	231,155	3,067,070	661,474	122,405	885,056	1,732,338	618,189	121,434
1958	7,462,089	238,911	3,293,677	492,862	179,231	852,387	1,898,862	371,961	134,198
1959	8,019,161	182,903	3,934,792	439,200	136,830	889,698	2,525,910	513,941	295,887
1960	9,564,649	157,041	4,224,537	438,659	197,036	897,915	3,019,061	538,971	111,479
1961	9,797,883	168,984	4,316,215	402,420	166,572	880,315	3,239,479	519,637	102,248
1962	10,729,396	173,481	4,712,082	424,730	231,084	931,611	3,571,339	587,579	97,088
1963	11,570,278	216,627	5,053,157	453,208	356,958	999,363	3,771,413	599,556	79,996
1964	12,473,258	117,888	5,180,790	521,888	439,110	1,176,260	4,315,725	651,472	71,887
1965	13,088,899	121,891	5,345,973	526,420	153,258	1,193,818	4,802,788	679,888	86,873
1966	13,596,755	109,310	5,601,636	552,911	92,820	1,213,514	5,096,086	734,279	119,244
1967	14,466,144	96,596	6,221,839	635,079	a	1,152,264	5,444,023	756,259	160,084
1968	16,165,632	171,193	6,718,108	807,886	a	1,228,498	6,250,067	775,465	214,435
1969	18,716,376	183,062	7,696,872	948,574	a	1,467,094	7,487,137	757,050	216,587
1970	18,789,162	212,177	7,568,691	897,130	a	1,335,851	7,730,058	790,655	254,680
1971	19,183,542	209,778	7,668,413	908,965	a	1,324,126	8,809,319	b	262,941
1972	21,833,700	302,481	8,253,340	1,130,263	a	1,479,190	10,358,858	b	315,968

a. Included in "Industrial".
b. Included in "Chemical Manufacturing".
Source: U.S. Bureau of Mines, *Liquefied Petroleum Gas Annual*, 1972.

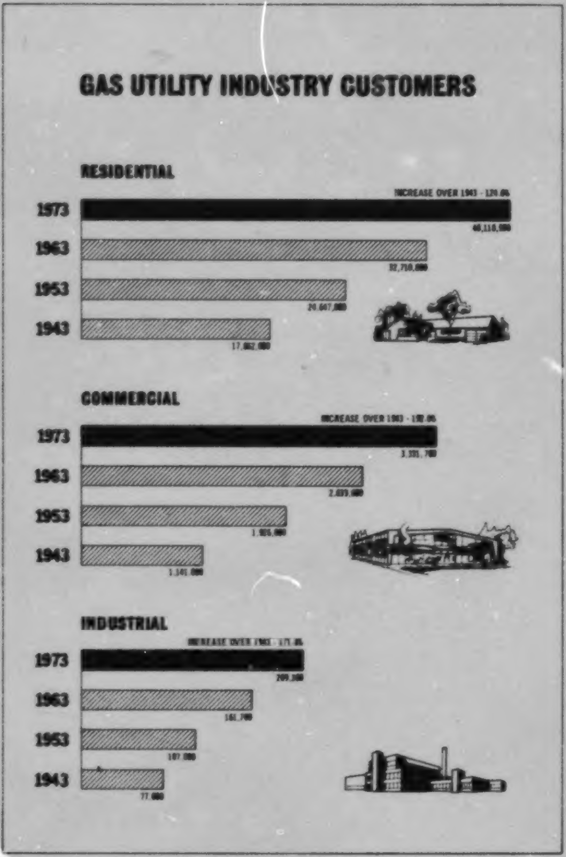
(Source 17)

U.S. Natural Gas Consumption by Sector, 1973 and 1985

(Trillions of Cubic Feet)



(Source 9)


GAS UTILITY INDUSTRY CUSTOMERS
RESIDENTIAL
INCREASE OVER 1943 - 124.6%
1973
40,110,500
1963
32,710,000
1953
24,647,000
1943
17,862,000
COMMERCIAL
INCREASE OVER 1943 - 192.0%
1973
3,331,700
1963
2,633,000
1953
1,926,000
1943
1,141,000
INDUSTRIAL
INCREASE OVER 1943 - 171.6%
1973
209,100
1963
161,700
1953
107,000
1943
77,000

(Source 9)

GAS UTILITY INDUSTRY CUSTOMERS, BY STATE, 1950-1973

Note: Data show yearly averages. Excludes customers purchasing for resale.

(Thousands)

Division and State	1950	1955	1960	1965	1970	1972R	1973
United States	**24,001.0**	**28,478.8**	**33,053.8**	**37,337.5**	**41,482.1**	**42,954.8**	**43,715.1**
New England	**1,641.7**	**1,616.5**	**1,622.6**	**1,641.6**	**1,692.3**	**1,691.3**	**1,707.3**
Connecticut	368.7	372.1	376.7	378.8	393.7	392.6	392.4
Maine	42.3	38.7	33.4	28.5	23.4	22.1	20.7
Massachusetts	1,004.2	988.3	1,002.3	1,024.7	1,055.3	1,053.0	1,066.9
New Hampshire	38.9	36.2	37.4	40.2	44.1	44.7	49.2
Rhode Island	166.2	159.9	155.9	154.5	161.4	163.3	161.7
Vermont	21.4	21.3	16.9	14.9	14.4	15.6	16.3
Middle Atlantic	**6,659.6**	**7,180.5**	**7,607.6**	**7,919.6**	**8,192.1**	**8,253.3**	**8,268.8**
New Jersey	1,191.1	1,360.7	1,504.9	1,640.6	1,763.1	1,799.0	1,809.1
New York	3,591.1	3,776.3	3,953.5	4,076.5	4,125.6	4,131.6	4,134.6
Pennsylvania	1,877.4	2,043.5	2,149.2	2,202.5	2,303.4	2,322.7	2,325.1
East North Central	**5,454.5**	**6,322.8**	**7,318.9**	**8,400.3**	**9,508.7**	**9,910.8**	**10,058.7**
Illinois	1,718.2	1,966.7	2,279.4	2,634.6	2,938.4	3,057.1	3,080.5
Indiana	573.7	674.6	780.0	933.8	1,084.4	1,134.6	1,155.7
Michigan	1,087.0	1,298.7	1,502.1	1,732.9	2,018.5	2,126.0	2,169.9
Ohio	1,643.6	1,908.6	2,208.4	2,424.2	2,644.5	2,717.2	2,749.4
Wisconsin	432.0	474.2	549.0	674.8	822.9	875.8	903.3
West North Central	**1,858.4**	**2,281.3**	**2,655.5**	**3,074.7**	**3,499.9**	**3,624.4**	**3,711.8**
Iowa	296.1	364.7	440.4	561.9	642.1	658.8	670.1
Kansas	381.6	477.8	532.8	586.5	643.1	658.3	668.4
Minnesota	344.4	408.4	476.1	540.9	640.9	673.8	688.6
Missouri	586.1	706.1	816.8	933.4	1,068.3	1,100.4	1,136.8
Nebraska	186.7	244.9	288.4	330.2	367.7	385.2	394.1
North Dakota	26.7	31.4	39.4	47.4	55.2	61.5	65.2
South Dakota	36.8	48.0	61.6	74.4	82.6	86.4	88.7
South Atlantic	**1,629.4**	**2,011.0**	**2,507.3**	**2,995.6**	**3,528.9**	**3,715.1**	**3,791.2**
Delaware	50.3	56.0	64.2	73.3	81.4	83.6	83.8
District of Columbia	175.2	181.9	177.3	172.4	162.8	161.3	159.5
Florida	173.1	184.2	244.1	294.2	370.1	390.7	393.8
Georgia	224.6	368.3	534.9	670.9	804.4	848.8	870.5
Maryland	384.8	477.0	558.7	639.4	712.5	743.9	760.2
North Carolina	68.4	75.2	121.6	193.2	285.2	315.8	326.8
South Carolina	42.3	47.9	87.0	154.7	233.3	262.4	274.7
Virginia	225.8	291.4	361.8	432.7	497.3	522.1	532.1
West Virginia	284.9	329.1	357.2	364.6	381.9	386.5	389.0
East South Central	**763.5**	**1,129.8**	**1,470.9**	**1,699.6**	**1,947.2**	**2,033.9**	**2,098.6**
Alabama	186.0	326.6	453.3	522.1	588.8	607.2	617.9
Kentucky	269.1	342.1	432.9	506.0	583.0	614.3	629.4
Mississippi	145.1	219.0	271.1	310.6	347.3	361.1	370.9
Tennessee	163.3	242.1	313.5	360.9	428.1	451.3	480.5
West South Central	**2,371.8**	**3,184.8**	**3,840.3**	**4,329.9**	**4,758.5**	**4,944.9**	**5,026.4**
Arkansas	172.4	236.3	299.1	362.1	419.3	441.7	448.6
Louisiana	401.0	551.3	701.2	804.7	871.3	924.5	946.5
Oklahoma	435.8	536.5	602.8	648.7	697.6	715.3	724.6
Texas	1,362.6	1,860.7	2,237.2	2,514.4	2,770.3	2,863.4	2,906.7
Mountain	**592.2**	**924.4**	**1,267.8**	**1,587.3**	**1,892.9**	**2,070.4**	**2,185.6**
Arizona	120.7	210.2	300.3	374.1	447.5	497.6	525.8
Colorado	188.3	296.8	388.4	485.7	586.5	637.5	676.6
Idaho	0.6	0.5	27.0	52.2	79.0	91.9	98.7
Montana	74.4	93.7	118.6	137.6	150.8	159.5	164.6
Nevada	4.9	14.5	24.6	47.8	72.4	88.3	97.1
New Mexico	83.3	136.5	176.6	203.8	231.8	248.6	260.0
Utah	76.3	116.3	166.5	211.9	243.8	261.4	273.6
Wyoming	43.7	55.9	65.8	74.2	81.1	85.5	89.2
Pacific	**3,029.9**	**3,827.7**	**4,762.9**	**5,688.9**	**6,461.6**	**6,710.7**	**6,866.7**
Alaska	a	a	b	6.1	17.4	19.6	22.8
California	2,846.4	3,673.5	4,506.6	5,311.1	5,919.4	6,120.2	6,247.7
Hawaii	a	a	39.8	36.2	36.1	36.1	35.9
Oregon	105.5	89.7	105.6	146.2	197.5	221.4	233.5
Washington	78.0	64.5	110.9	189.3	291.2	313.4	326.8

a. Excludes data for Alaska prior to 1959 and Hawaii prior to 1960.
b. Not available.
R – Revised.

(Source 9)

GAS UTILITY INDUSTRY CUSTOMERS, BY STATE AND CLASS OF SERVICE, AVERAGES FOR 1973

(Thousands)

Division and State	Total	Class of Service			
		Residential	Commercial	Industrial	Other
United States	43,715.1	40,118.9	3,331.7	209.3	55.2
New England	1,707.3	1,581.7	109.5	12.6	3.5
Connecticut	392.4	360.2	29.5	2.6	0.1
Maine	20.7	19.2	1.2	0.0	0.3
Massachusetts	1,066.9	991.1	64.7	8.2	2.9
New Hampshire	49.2	44.9	4.0	0.3	[illegible]
Rhode Island	161.7	150.9	9.2	1.6	[illegible]
Vermont	16.3	15.3	0.9	0.0	0.0
Middle Atlantic	8,268.8	7,644.2	583.2	28.7	12.7
New Jersey	1,909.1	1,636.9	178.0	6.2	0.2
New York	4,134.6	3,853.2	257.3	13.9	10.2
Pennsylvania	2,225.1	2,166.2	147.9	8.6	2.3
East North Central	10,858.7	9,242.9	763.7	48.4	3.7
Illinois	3,000.5	2,900.1	213.7	18.0	0.5
Indiana	1,155.7	1,043.2	107.8	4.2	0.4
Michigan	2,169.9	1,984.4	174.6	10.9	0.0
Ohio	2,749.4	2,541.6	198.4	6.8	2.6
Wisconsin	903.3	825.4	69.3	8.5	0.1
West North Central	3,711.8	3,349.1	330.6	29.7	2.4
Iowa	670.1	596.2	71.7	2.0	0.2
Kansas	668.4	609.3	55.1	8.3	0.7
Minnesota	688.6	626.2	56.3	5.6	0.5
Missouri	1,136.8	1,046.4	85.7	4.2	0.5
Nebraska	394.1	341.2	43.5	9.0	0.5
North Dakota	65.2	56.9	8.0	0.3	0.0
South Dakota	88.7	78.0	10.3	0.3	0.1
South Atlantic	3,791.2	3,461.5	297.7	30.3	11.7
Delaware	83.8	78.3	5.3	0.2	0.0
District of Columbia	159.5	140.7	15.8	0.8	2.2
Florida	393.8	365.6	26.0	0.7	0.8
Georgia	870.5	800.7	63.1	5.9	0.8
Maryland	760.2	705.5	47.8	5.7	1.2
North Carolina	326.0	282.2	37.8	2.5	4.4
South Carolina	274.7	246.6	26.2	1.2	0.7
Virginia	532.8	485.2	43.3	2.8	1.5
West Virginia	389.0	356.7	31.7	0.5	0.2
East South Central	2,098.6	1,896.1	184.2	6.6	11.7
Alabama	617.9	571.7	42.8	1.2	2.2
Kentucky	629.4	573.6	53.4	1.1	1.3
Mississippi	370.9	332.9	36.7	1.5	1.7
Tennessee	480.5	417.9	53.2	2.9	6.4
West South Central	5,326.4	4,866.3	419.3	37.8	2.8
Arkansas	448.6	397.7	48.4	2.4	0.1
Louisiana	946.5	879.4	63.2	2.7	1.2
Oklahoma	734.6	652.6	66.6	4.2	0.3
Texas	2,986.7	2,633.6	241.0	27.7	4.3
Mountain	2,185.6	1,963.1	208.4	10.6	3.6
Arizona	535.8	488.0	42.2	2.7	0.8
Colorado	676.6	600.5	73.6	2.5	0.1
Idaho	98.7	85.7	12.6	0.4	0.0
Montana	164.6	145.7	18.2	0.6	0.0
Nevada	97.1	89.1	7.9	0.1	0.0
New Mexico	260.0	230.6	26.0	3.3	2.1
Utah	273.6	252.6	19.5	0.7	0.0
Wyoming	89.2	78.0	10.8	0.3	0.5
Pacific	6,866.7	6,415.8	436.2	15.5	0.2
Alaska	22.8	19.5	3.2	0.1	0.0
California	5,897.9	5,071.0	364.7	11.8	0.2
Hawaii	30.9	28.0	8.0	1.7	0.0
Oregon	[illegible]	[illegible]	[illegible]	0.6	0.0
Washington	[illegible]	[illegible]	[illegible]	1.2	0.0

(Source 9)

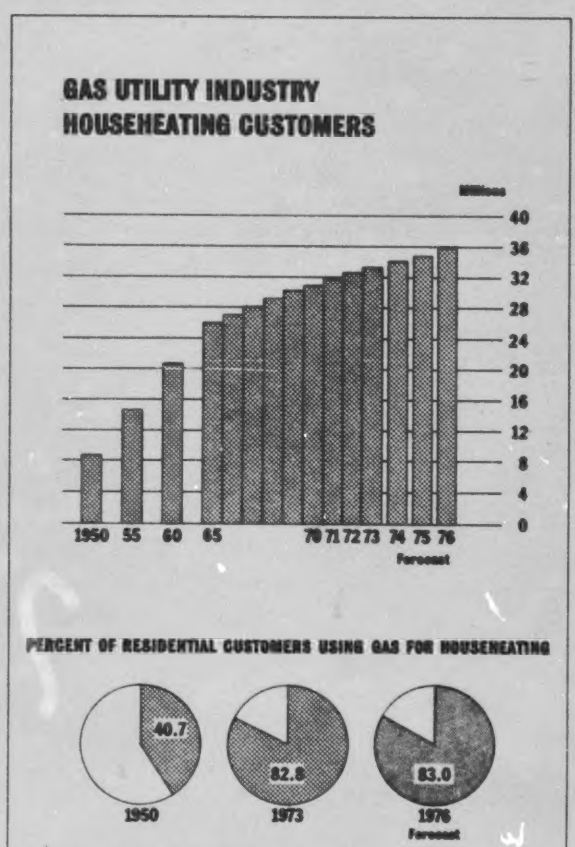
GAS CONSUMED FOR ELECTRIC GENERATION, BY STATE, 1950-1973

(Millions of Cubic Feet)

Division and State	1950	1955	1960	1965	1970	1972	1973
United States	**628,913**	**1,153,200**	**1,724,762**	**2,321,101**	**3,931,996**	**3,978,673**	**3,605,333**
New England	**0**	**9,495**	**12,885**	**13,918**	**8,133**	**8,977**	**6,128**
Connecticut	0	852	1,756	337	147	30	0
Maine	0	0	0	0	0	0	0
Massachusetts	0	8,532	10,785	13,098	5,668	8,082	5,342
New Hampshire	0	0	0	0	0	115	152
Rhode Island	0	111	344	483	2,318	148	29
Vermont	0	0	0	0	0	602	605
Middle Atlantic	**1,640**	**42,821**	**89,288**	**97,850**	**161,385**	**106,020**	**96,869**
New Jersey	0	14,064	25,482	22,440	45,891	25,039	24,067
New York	66	25,497	57,819	74,189	106,140	75,507	69,532
Pennsylvania	1,574	3,260	5,987	1,221	9,354	5,474	3,270
East North Central	**37,493**	**66,881**	**61,407**	**68,232**	**278,280**	**194,482**	**142,238**
Illinois	33,851	55,525	42,348	34,618	132,382	72,795	39,823
Indiana	1,066	6,565	8,790	13,272	29,507	17,972	10,245
Michigan	73	332	5,209	2,989	64,407	58,953	46,412
Ohio	2,490	4,403	2,992	2,947	21,380	16,688	16,091
Wisconsin	13	56	2,068	14,406	30,604	28,074	29,667
West North Central	**111,031**	**178,975**	**245,084**	**303,818**	**420,086**	**404,764**	**407,453**
Iowa	17,372	40,317	48,587	52,238	77,910	60,775	61,847
Kansas	39,466	60.071	82,195	112,955	167,885	180,157	176,174
Minnesota	17,764	31,232	48,521	51,420	58,954	51,925	56,661
Missouri	21,206	22,679	30,251	47,552	62,970	58,896	54,262
Nebraska	12,106	21,046	30,973	36,269	47,641	49,140	54,100
North Dakota	183	216	103	25	362	328	349
South Dakota	2,934	3,414	4,454	3,359	4,364	3,543	4,060
South Atlantic	**29,775**	**62,076**	**147,439**	**117,395**	**343,408**	**264,416**	**251,299**
Delaware	0	1,666	3,190	4,611	3,744	2,429	2,310
District of Columbia	0	0	0	0	0	0	0
Florida	5,255	7,935	88,518	87,001	198,367	170,221	168,308
Georgia	24,299	34,880	25,336	831	58,674	38,433	34,392
Maryland	4	79	78	56	11,435	7,043	8,870
North Carolina	0	0	4,660	2,895	21,126	16,812	7,748
South Carolina	0	15,487	23,278	18,801	45,081	24,509	25,105
Virginia	30	662	1,430	2,268	4,276	4,512	4,172
West Virginia	187	1,367	941	932	705	457	394
East South Central	**40,959**	**58,938**	**53,249**	**78,626**	**140,940**	**129,330**	**82,272**
Alabama	18,396	17,414	9,378	5,561	15,444	2,748	2,377
Kentucky	3,258	6,043	2,288	453	8,533	10,014	8,067
Mississippi	15,378	33,297	34,358	56,360	99,710	100,403	59,843
Tennessee	5,927	2,184	7,225	16,252	17,253	16,165	11,985
West South Central	**281,001**	**455,170**	**656,727**	**1,009,857**	**1,735,541**	**1,999,781**	**1,916,930**
Arkansas	19,483	46,297	46,779	67,510	107,445	72,352	48,279
Louisiana	60,845	70,813	119,818	175,573	331,750	382,370	355,023
Oklahoma	35,266	64,780	82,820	127,231	234,721	259,944	252,734
Texas	165,407	273,280	407,310	639,543	1,061,625	1,285,114	1,260,894
Mountain	**48,692**	**95,260**	**134,990**	**136,442**	**198,745**	**251,620**	**228,174**
Arizona	13,806	26,681	53,246	36,740	58,898	77,715	56,501
Colorado	19,954	35,550	37,015	35,539	51,194	66,929	58,602
Idaho	0	0	0	0	0	0	0
Montana	897	633	341	1,992	2,529	1,217	2,322
Nevada	1	0	6,339	13,271	25,336	40,043	40,538
New Mexico	12,876	21,663	33,701	43,996	54,894	59,141	65,125
Utah	31	9,757	3,677	4,742	3,520	3,718	4,302
Wyoming	1,127	975	671	163	2,373	2,857	784
Pacific	**78,322**	**183,664**	**323,693**	**494,963**	**645,478**	**619,283**	**473,970**
Alaska	0	0	0	2,149	8,198	13,084	15,400
California	78,322	183,664	322,992	492,701	636,270	605,791	455,063
Hawaii	0	0	0	0	0	0	0
Oregon	0	0	701	113	1,010	408	3,507
Washington	0	0	0	0	0	0	0

Source: *Federal Power Commission News*, 7:21 May 24, 1974.

(Source 9)



GAS UTILITY INDUSTRY HOUSEHEATING CUSTOMERS

PERCENT OF RESIDENTIAL CUSTOMERS USING GAS FOR HOUSEHEATING

REFERENCE: TABLE 61

(Source 9)

GAS UTILITY INDUSTRY HOUSEHEATING CUSTOMERS, BY STATE, YEARLY AVERAGES FOR 1965, 1970 and 1972-1973

Note: Percentages refer to proportion of residential gas customers using gas for heating.

(Thousands)

	1965	1970	1972	1973	
Division and State	Customers	Customers	Customers	Customers	Percent
United States	26,130.2	30,856.2	32,418.5	33,321.9	82.8
New England	564.8	734.2	800.9	833.4	53.2
Connecticut	135.1	178.8	186.2	189.7	53.5
Maine	5.4	6.1	5.5	5.2	28.5
Massachusetts	344.1	436.2	489.7	512.0	51.2
New Hampshire	16.2	24.1	25.3	26.3	63.8
Rhode Island	63.8	81.2	84.9	90.3	60.9
Vermont	0.2	7.8	9.3	9.9	67.1
Middle Atlantic	3,162.9	3,762.0	3,849.0	3,977.3	52.1
New Jersey	537.4	695.9	783.7	776.5	47.6
New York	1,308.7	1,513.5	1,438.6	1,547.8	41.5
Pennsylvania	1,316.8	1,552.6	1,626.8	1,653.3	76.8
East North Central	6,024.9	7,438.7	7,946.8	8,112.4	88.1
Illinois	1,645.0	2,077.1	2,225.9	2,278.7	80.2
Indiana	577.8	794.5	872.6	901.0	86.6
Michigan	1,295.1	1,641.1	1,771.9	1,817.4	91.5
Ohio	2,103.4	2,353.7	2,444.8	2,456.7	96.8
Wisconsin	403.6	572.3	631.8	658.5	80.7
West North Central	2,471.9	2,902.8	3,061.7	3,161.0	94.4
Iowa	416.8	517.4	525.6	541.1	92.7
Kansas	512.2	560.7	589.5	603.9	99.2
Minnesota	428.3	[illegible]	539.3	550.5	88.7
Missouri	757.3	[illegible]	973.1	1,014.8	95.8
Nebraska	264.9	298.5	315.1	325.9	95.4
North Dakota	32.8	41.3	47.9	51.7	89.8
South Dakota	59.6	68.0	71.4	73.2	94.9
South Atlantic	2,056.2	2,590.7	2,844.3	2,918.4	82.8
Delaware	31.0	42.0	45.7	46.4	59.6
District of Columbia	79.1	82.8	84.9	85.6	61.0
Florida	179.7	243.3	279.2	282.3	73.3
Georgia	593.9	721.4	767.6	787.9	96.9
Maryland	351.9	440.8	486.3	506.2	72.3
North Carolina	136.3	208.8	252.3	263.6	91.7
South Carolina	104.0	178.3	207.5	213.6	84.6
Virginia	263.9	335.7	368.7	379.9	77.9
West Virginia	316.4	337.6	352.2	352.9	97.2
East South Central	1,419.2	1,692.7	1,795.7	1,824.1	95.9
Alabama	449.8	541.4	557.4	561.0	97.9
Kentucky	400.6	488.5	525.3	534.4	92.9
Mississippi	273.3	308.9	332.8	340.3	98.2
Tennessee	295.5	353.9	380.3	388.4	96.0
West South Central	3,897.8	4,264.8	4,409.2	4,438.0	97.4
Arkansas	317.2	369.6	388.1	395.8	99.6
Louisiana	738.6	735.7	835.3	849.1	99.2
Oklahoma	582.5	625.8	652.2	658.9	99.5
Texas	2,259.5	2,533.7	2,533.6	2,534.1	95.8
Mountain	1,366.4	1,650.1	1,836.0	1,940.3	97.8
Arizona	319.8	391.6	439.1	463.8	95.5
Colorado	417.9	510.0	572.8	608.8	99.9
Idaho	40.1	66.9	79.3	89.1	99.8
Montana	115.9	126.0	131.4	137.7	95.4
Nevada	43.1	66.4	77.6	87.0	98.6
New Mexico	180.0	203.5	220.4	224.7	93.4
Utah	186.6	217.6	240.9	252.5	98.8
Wyoming	63.0	68.1	74.7	76.7	99.0
Pacific	5,166.1	5,820.2	5,875.2	6,117.0	94.9
Alaska	5.0	14.0	16.0	17.7	94.7
California	4,908.9	5,403.6	5,404.9	5,622.2	95.3
Hawaii	0.0	0.0	0.0	0.0	0.0
Oregon	105.4	164.0	187.1	197.7	94.4
Washington	146.8	238.6	267.2	279.4	97.2

(Source 9)

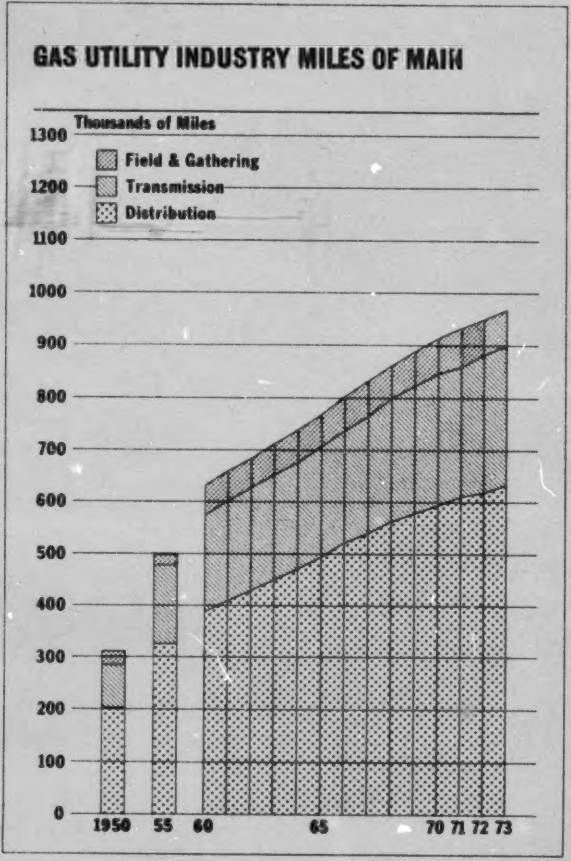
GAS UTILITY INDUSTRY SALES, BY STATE AND CLASS OF SERVICE, 1973

(Trillions of Btu)

Division and State	Total	Class of Service: Residential	Commercial	Industrial	Other	Average Btu. Value
United States	16,483.9	4,993.9	2,282.7	8,372.6	834.7	1,021
New England	262.1	141.6	57.5	56.7	6.3	1,013
Connecticut	62.6	31.2	14.3	17.2	0.0	1,015
Maine	1.8	0.7	0.5	0.5	0.1	1,011
Massachusetts	162.2	90.9	36.4	30.4	4.4	1,011
New Hampshire	10.4	4.7	2.0	2.2	1.5	1,008
Rhode Island	21.7	12.7	3.9	4.9	0.3	1,016
Vermont	3.3	1.3	0.5	1.5	0.0	1,006
Middle Atlantic	1,670.0	796.7	284.4	557.9	31.0	1,032
New Jersey	294.9	147.9	61.9	82.8	2.2	1,027
New York	605.1	349.1	113.1	124.9	18.0	1,030
Pennsylvania	770.0	299.6	109.4	350.2	10.7	1,036
East North Central	3,958.3	1,520.2	704.0	1,693.0	41.1	1,017
Illinois	1,099.0	465.3	213.2	417.8	2.6	1,023
Indiana	519.7	157.4	75.8	285.2	1.3	998
Michigan	881.0	338.7	178.8	356.2	7.3	1,010
Ohio	1,091.8	444.6	183.2	449.2	14.8	1,025
Wisconsin	366.8	114.1	53.1	184.5	15.2	1,015
West North Central	1,782.6	517.1	267.3	940.0	58.2	999
Iowa	309.6	90.5	55.8	146.1	17.1	1,012
Kansas	495.5	93.7	36.9	354.9	10.0	988
Minnesota	323.1	100.6	49.0	166.7	6.8	999
Missouri	391.5	158.4	75.7	145.8	11.6	995
Nebraska	206.5	53.7	29.3	111.7	11.7	1,005
North Dakota	24.7	8.9	11.3	4.1	0.5	1,024
South Dakota	31.7	11.2	9.4	10.7	0.5	1,002
South Atlantic	1,309.3	355.6	185.6	715.7	52.4	1,028
Delaware	23.4	7.9	3.3	10.6	1.7	1,020
District of Columbia	27.1	13.7	10.5	0.9	2.1	1,013
Florida	161.9	15.7	23.2	100.9	22.1	1,043
Georgia	325.1	88.5	42.7	191.5	2.3	1,030
Maryland	163.1	72.7	20.9	65.7	3.8	1,020
North Carolina	156.4	29.7	18.1	104.7	4.0	1,027
South Carolina	146.6	20.8	14.3	104.1	7.4	1,026
Virginia	144.3	51.7	28.6	56.9	7.1	1,025
West Virginia	161.5	54.9	24.2	80.5	2.0	1,030
East South Central	922.2	212.5	120.7	551.9	37.1	1,023
Alabama	258.7	53.7	30.3	174.4	0.4	1,029
Kentucky	201.5	81.5	36.1	76.5	7.3	1,019
Mississippi	197.9	30.5	15.4	140.5	11.5	1,024
Tennessee	264.1	46.8	38.9	160.4	17.9	1,022
West South Central	3,260.6	462.6	215.5	2,310.7	271.8	1,026
Arkansas	259.4	47.8	29.5	180.1	2.0	999
Louisiana	576.5	76.4	27.0	461.1	12.0	1,031
Oklahoma	382.1	85.2	43.1	143.3	110.5	1,023
Texas	2,042.7	253.3	115.9	1,526.2	147.3	1,027
Mountain	1,032.0	271.6	160.7	566.9	32.8	1,033
Arizona	184.4	40.0	24.4	110.2	9.8	1,056
Colorado	294.4	96.6	64.7	131.2	1.9	962
Idaho	52.0	10.0	7.9	34.1	0.0	1,058
Montana	81.7	24.7	16.3	36.5	4.2	1,032
Nevada	76.4	9.4	8.0	58.2	0.8	1,067
New Mexico	142.4	30.7	14.8	82.8	14.1	1,067
Utah	123.4	46.5	15.7	61.2	0.0	945
Wyoming	77.3	13.8	8.8	52.8	2.0	1,017
Pacific	2,286.7	716.1	286.9	979.7	304.1	1,052
Alaska	27.0	4.3	3.9	12.7	6.1	1,010
California	1,962.0	651.1	235.0	778.0	297.9	1,053
Hawaii	3.5	1.0	0.7	1.8	0.0	935
Oregon	102.6	23.1	13.9	65.6	0.0	1,059
Washington	191.6	36.6	33.4	121.6	0.0	1,051

TRANSMISSION

(Source 9)


GAS UTILITY INDUSTRY MILES OF MAIN
Thousands of Miles
Field & Gathering
Transmission
Distribution
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
1950
55
60
65
70
71
72
73

(Source 9)

GAS UTILITY INDUSTRY MILES OF MAIN, BY STATE AND BY TYPE OF MAIN, 1973

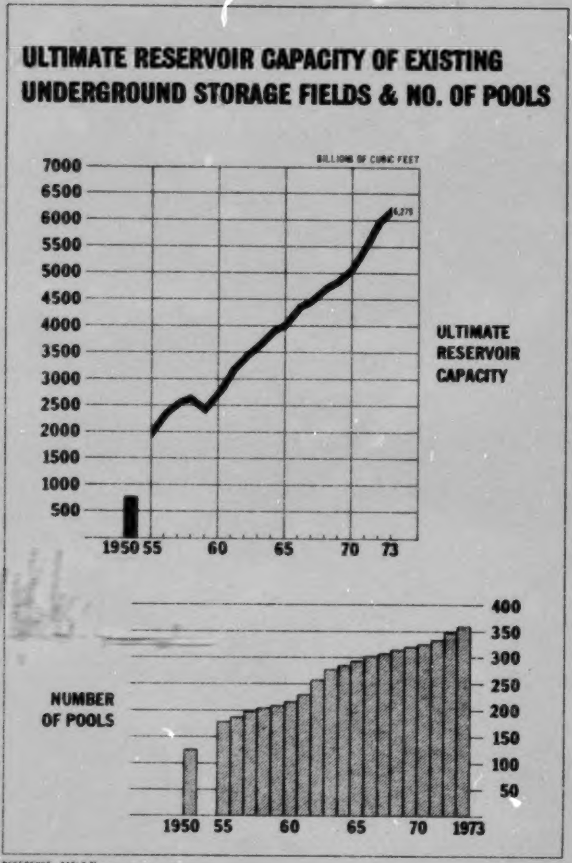
Note: Excludes service pipe. Data not adjusted to common diameter equivalent. Mileage shown as of end of year.

Division and State	Total	Field and Gathering	Transmission[a]	Distribution
United States	**967,667**	**68,180**	**265,196**	**634,291**
New England	**27,547**	**0**	**1,742**	**25,805**
Connecticut	5,952	0	546	5,406
Maine	462	0	80	382
Massachusetts	17,278	0	802	16,476
New Hampshire	1,163	0	201	962
Rhode Island	2,377	0	53	2,324
Vermont	335	0	60	275
Middle Atlantic	**113,552**	**6,183**	**17,484**	**89,885**
New Jersey	21,934	0	1,301	20,633
New York	[illegible]	189	4,380	35,817
Pennsylvania	51,232	5,994	11,803	33,435
East North Central	**186,248**	**4,615**	**34,879**	**146,754**
Illinois	[illegible]	125	9,917	39,347
Indiana	[illegible]	263	5,728	20,025
Michigan	[illegible]	180	6,207	32,697
Ohio	51,197	4,047	9,815	37,335
Wisconsin	20,562	0	3,212	17,350
West North Central	**108,325**	**7,377**	**41,713**	**59,235**
Iowa	16,921	48	6,069	10,804
Kansas	36,673	7,252	17,196	12,225
Minnesota	15,502	0	4,063	11,439
Missouri	20,188	29	4,092	16,067
Nebraska	14,177	31	8,236	5,910
North Dakota	2,472	17	1,108	1,347
South Dakota	2,392	0	949	1,443
South Atlantic	**97,843**	**8,986**	**21,718**	**67,139**
Delaware	1,288	0	228	1,060
District of Columbia	1,169	0	29	1,140
Florida	11,795	0	2,948	8,847
Georgia	21,616	11	5,012	16,593
Maryland	8,466	27	726	7,713
North Carolina	11,437	0	2,308	9,129
South Carolina	9,619	0	2,375	7,244
Virginia	10,868	48	2,406	8,414
West Virginia	21,585	8,900	5,686	6,999
East South Central	**69,108**	**3,693**	**26,765**	**38,650**
Alabama	17,406	20	5,426	11,960
Kentucky	19,627	3,497	6,901	9,229
Mississippi	16,781	176	9,328	7,277
Tennessee	15,294	0	5,110	10,184
West South Central	**194,121**	**23,958**	**83,607**	**86,556**
Arkansas	17,016	731	6,592	9,693
Louisiana	39,315	2,755	21,711	14,849
Oklahoma	32,609	8,521	11,296	12,792
Texas	[illegible]	11,951	44,008	49,222
Mountain	**[illegible]**	**12,583**	**26,885**	**40,808**
Arizona	[illegible]	2	5,062	9,766
Colorado	[illegible]	1,337	6,380	10,729
Idaho	3,594	0	1,117	2,477
Montana	6,998	1,465	2,890	2,643
Nevada	2,766	0	1,166	1,600
New Mexico	20,761	8,087	5,924	6,750
Utah	6,165	474	828	4,863
Wyoming	6,716	1,218	3,518	1,980
Pacific	**90,647**	**785**	**10,403**	**79,459**
Alaska	690	0	146	544
California	70,133	785	7,210	62,138
Hawaii	558	0	0	558
Oregon	8,659	0	1,163	7,496
Washington	10,607	0	1,884	8,723

[a] Includes 3,427 miles of underground storage mains.

STORAGE

(Source 9)



ULTIMATE RESERVOIR CAPACITY OF EXISTING UNDERGROUND STORAGE FIELDS & NO. OF POOLS

REFERENCE TABLE 51

(Source 9)

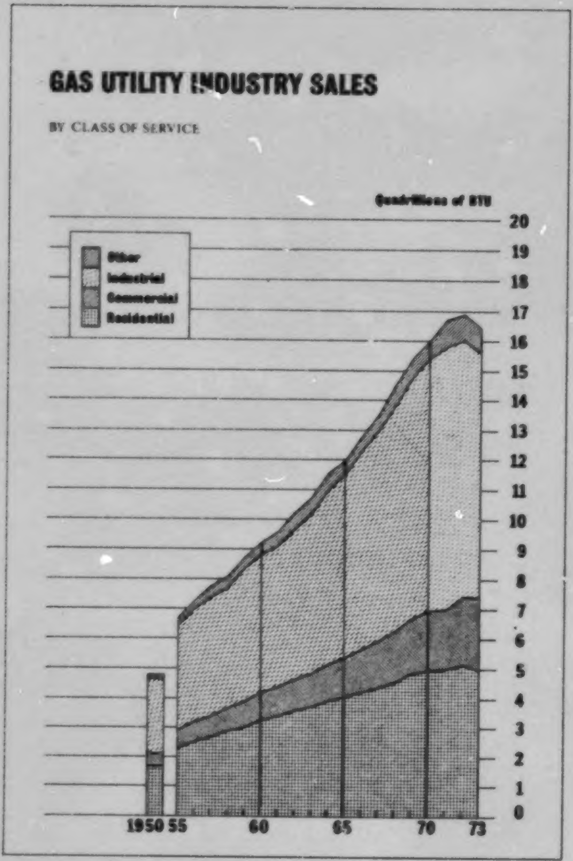
INPUTS, OUTPUTS, AND GAS IN UNDERGROUND STORAGE, BY STATE, 1973

(Millions of cubic feet — 14.73 psia at 60° F.)

Division and State	Input to Storage	Output from Storage	Gas in Storage	Maximum Gas in Storage	Maximum Day Output
	Year Ending December 31, 1973				
United States	1,910,540	1,521,368	3,990,332	4,361,002	28,615
New England	0	0	0	0	0
Middle Atlantic	388,315	339,672	715,730	788,386	5,976
New Jersey	0	0	0	0	0
New York	44,913	36,067	101,694	108,783	833
Pennsylvania	343,400	303,605	614,076	679,603	5,153
East North Central	735,462	687,533	1,468,180	1,636,289	10,097
Illinois	158,212	136,668	571,314	609,876	3,373
Indiana	27,300	17,708	72,981	75,276	843
Michigan	370,872	377,964	430,779	530,131	4,101
Ohio	179,078	155,193	392,114	419,824	2,601
Wisconsin	0	0	0	0	0
West North Central	115,640	80,893	297,259	329,176	1,390
Iowa	56,300	30,008	163,330	174,900	590
Kansas	41,880	33,206	83,596	103,819	443
Minnesota	839	300	4,675	4,833	30
Missouri	10,555	7,317	27,997	30,801	351
Nebraska	5,131	1,976	17,873	17,289	66
North Dakota	0	0	0	0	0
South Dakota	0	0	0	0	0
South Atlantic	191,308	168,597	397,014	430,447	2,966
Delaware	0	0	0	0	0
District of Columbia	0	0	0	0	0
Florida	0	0	0	0	0
Georgia	0	0	0	0	0
Maryland	14,960	14,857	27,083	30,042	389
North Carolina	0	0	0	0	0
South Carolina	0	0	0	0	0
Virginia	0	0	0	0	0
West Virginia	176,348	153,740	369,931	393,905	2,577
East South Central	92,648	70,085	161,673	249,593	1,909
Alabama	0	0	0	0	0
Kentucky	53,814	37,026	83,231	167,239	683
Mississippi	38,834	33,059	78,442	82,334	1,226
Tennessee	0	0	0	9	0
West South Central	231,623	166,736	501,581	538,707	3,253
Arkansas	2,327	1,486	10,830	11,083	64
Louisiana	99,113	65,360	179,163	180,303	1,186
Oklahoma	84,086	67,855	220,127	300,571	1,059
Texas	46,038	32,913	91,463	97,841	973
Mountain	63,626	23,900	209,237	217,031	726
Arizona	0	0	0	0	0
Colorado	10,146	3,295	15,601	18,118	388
Idaho	0	0	0	0	0
Montana	16,909	13,406	138,173	143,712	203
Nevada	0	0	0	0	0
New Mexico	6,793	0	6,793	6,793	0
Utah	777	600	1,777	1,783	40
Wyoming	8,943	7,391	42,844	46,626	136
Pacific	92,166	62,177	175,560	178,203	1,601
Alaska	0	0	0	0	0
California	83,236	56,437	156,196	158,396	1,418
Hawaii	0	0	0	0	0
Oregon	0	0	0	0	0
Washington	8,930	5,740	19,364	20,045	183

MISCELLANEOUS DATA

(Source 9)



GAS UTILITY INDUSTRY SALES

BY CLASS OF SERVICE

(Source 9)

GAS UTILITY INDUSTRY SALES, BY CLASS OF SERVICE, 1950-1972[a]

(Trillions of Btu)

Year	Total	Residential	Commercial	Industrial	Other
1950	4,209.1	1,383.9	410.4	2,288.7	126.1
1955	6,658.6	2,338.7	602.9	3,335.1	381.9
1956	7,254.2	2,464.3	655.8	3,868.7	365.4
1957	7,703.5	2,598.5	698.9	4,067.6	358.5
1958	8,078.6	2,812.5	764.9	4,076.4	374.8
1959	8,791.8	2,972.9	837.5	4,363.1	427.3
1960	9,287.7	3,188.1	919.8	4,709.4	470.4
1961	9,589.0	3,321.0	988.1	4,785.6	494.3
1962	10,234.8	3,536.9	1,092.9	5,100.1	504.9
1963	10,766.3	3,668.0	1,136.6	5,438.1	523.6
1964	11,591.2	3,869.7	1,273.5	5,912.0	536.0
1965	11,980.3	3,999.0	1,344.8	6,146.5	490.0
1966	12,859.1	4,175.4	1,462.8	6,653.3	567.6
1967	13,488.3	4,365.3	1,577.6	7,014.3	531.1
1968	14,472.4	4,552.7	1,704.9	7,595.1	619.7
1969	15,391.6	4,820.4	1,878.1	8,135.8	557.3
1970	16,043.5	4,923.7	2,006.6	8,439.2	674.0
1971	16,679.5	5,030.7	2,155.5	8,643.4	800.9
1972[R]	17,082.1	5,143.7	2,279.3	8,776.6	882.3
1973	16,483.9	4,993.9	2,282.7	8,372.6	834.7

a. Includes data for Hawaii subsequent to 1959 and Alaska subsequent to 1960.
R—Revised.

(Source 9)

AVERAGE ANNUAL INDEXES OF RETAIL PRICES OF SPECIFIED FUELS AND ELECTRICITY, 1950-1973 AND AT QUARTERLY INTERVALS, 1973

Note: Applicable to "wage earners and clerical workers in urban United States." As of January, 1966, gas prices were collected for use other than heating in 55 cities and gas for heating in 51 cities.

(1967 = 100)

Year and Month	Gas: For Heating	Gas: For Other Uses	Electricity	Number 2 Fuel Oil
1950	69.9	73.6	90.8	72.6
1951	70.5	73.4	91.5	76.7
1952	72.7	74.6	92.4	78.6
1953	76.6	76.0	93.6	82.7
1954	78.7	77.2	94.0	83.2
1955	82.9	79.7	95.2	86.0
1956	83.5	81.5	95.5	90.2
1957	84.4	83.1	95.9	94.8
1958	89.3	88.1	97.1	89.4
1959	92.3	91.1	98.5	90.6
1960	100.1	96.1	99.8	89.0
1961	100.7	97.7	100.1	92.6
1962	100.0	98.1	100.1	92.7
1963	99.9	98.3	100.1	94.6
1964	100.2	98.6	99.6	92.5
1965	99.9	99.3	99.1	94.4
1966	100.4	100.0	99.1	96.9
1967	100.0	100.0	100.0	100.0
1968	101.1	100.8	100.9	103.2
1969	102.6	103.1	102.8	105.4
1970	107.4	109.4	106.2	109.3
1971	115.2	117.4	113.2	110.1
1972	122.1	122.5	118.9	116.6
1973	127.8	128.0	124.9	134.5
1973 March	126.6	126.9	123.4	125.7
June	126.1	126.5	124.6	130.6
September	126.8	127.7	125.8	132.4
December	133.7	132.5	129.0	171.8

Source: Bureau of Labor Statistics, *Wholesale Prices and Price Indexes*, December 1973.

(Source 31)

-Natural gas prices reported by major interstate pipeline companies

(cents per Mcf)

	Field price paid to producers by interstate pipelines*	Percent change	Price at city gate**	Percent change
1974				
Oct.	27.47	+16.2	64.25	+24.5
Sept.	27.29	+19.0	65.23	+28.0
Aug.	26.11	+15.2	64.58	+26.6
July	26.32	+16.7	61.94	+20.5
June	25.97	+15.5	59.45	+14.0
May	25.70	+15.0	58.62	+19.4
Apr.	25.75	+17.2	57.55	+18.1
Mar.	25.66	+18.1	56.85	+18.5
Feb.	25.39	+18.6	56.43	+17.9
Jan.	24.33	+14.6	55.05	+18.2
1973				
Oct.	23.64		51.63	
Sept.	22.93		50.96	
Aug.	22.67		51.00	
July	22.56		51.39	
Jun.	22.49		52.14	
May	22.34		49.10	
Apr.	21.98		48.74	
Mar.	21.73		47.96	

continued on page 236

(Source 31)

-Natural gas prices reported by major interstate pipeline companies--Continued
(cents per Mcf)

	Field price paid to producers by interstate pipelines*	Percent change	Price at city gate**	Percent change
Feb.	21.41		47.86	
Jan.	21.33		46.56	

*FPC Form 11 entitled "Natural gas purchases from domestic producers."
**FPC Form 11 entitled "Gas sales to intrastate companies under FPC rate schedule."

Source: Federal Power Commission.

(Source 9)

GAS UTILITY INDUSTRY, GAS SUPPLY AND DISPOSITION, 1950-1973

(Trillions of Btu)

Note: Includes Natural Gas only prior to 1970

	Amount						
	1950	1955	1960	1965	1970	1972	1973
Supply – Produced and Purchased – Total	**4,595.2**	**7,531.0**	**10,544.6**	**13,315.9**	**18,829.5**	**19,259.0**	**18,804.3**
Natural	4,595.2	7,531.0	10,544.6	13,315.9	18,620.8	19,083.3	18,665.5
Manufactured	a	a	a	a	75.6	75.2	19.1
Liquefied Petroleum Gas	a	a	a	a	26.9	25.8	35.6
Substitute Natural Gas	a	a	a	a	0.0	0.8	10.8
Liquefied Natural Gas	a	a	a	a	0.0	2.5	2.6
Other Gases	a	a	a	a	106.2	71.5	70.7
Disposition – Total	**4,595.2**	**7,531.0**	**10,544.6**	**13,315.9**	**18,829.5**	**19,259.0**	**18,804.3**
Used in Production of Other Gases[b]	130.1	311.0	215.9	136.7	125.4	130.1	131.0
Company Use as a Fuel[c]	350.0	557.7	757.6	995.7	1,380.1	1,497.3	1,389.9
Sales to Ultimate Consumers	3,850.0	6,300.8	9,054.6	11,842.0	16,043.5	17,082.1[R]	16,483.9
Other Deliveries (Net)	3.8	56.8	54.9	89.6	70.1	126.5[R]	102.0
Placed in Storage (Net)	60.9	64.4	164.7	67.6	473.6	11.0	421.9
Unaccounted For[d]	183.4	240.3	296.9	184.3	736.8	412.1[R]	275.5

a. Not available.
b. Includes Natural Gas used for enriching, reforming and mixing.
c. Includes interdepartmental transfers.
d. Represents difference between supply and disposition, and should not be interpreted as a reliable measure of transmission efficiency.
R - Revised.

(Source 9)

CONVERSION TABLE

The following are some frequently used units of measure and natural gas equivalents in British thermal units (Btu). For ease of computation, the actual natural gas equivalent has been rounded to the nearest hundred.

1 Cubic Foot = 1,000 Btu

1 Therm = 100 Cubic Feet = 100,000 Btu

1 Mcf = 1,000 Cubic Feet = 1,000,000 Btu

1 M Therm = 100,000 Cubic Feet = 100,000,000 Btu

1 M Mcf = 1,000,000 Cubic Feet = 1,000,000,000 Btu

NUCLEAR ENERGY
UNITED STATES AND FOREIGN STATISTICS

(Source 31)

-Free world commercial nuclear power generation, 1974

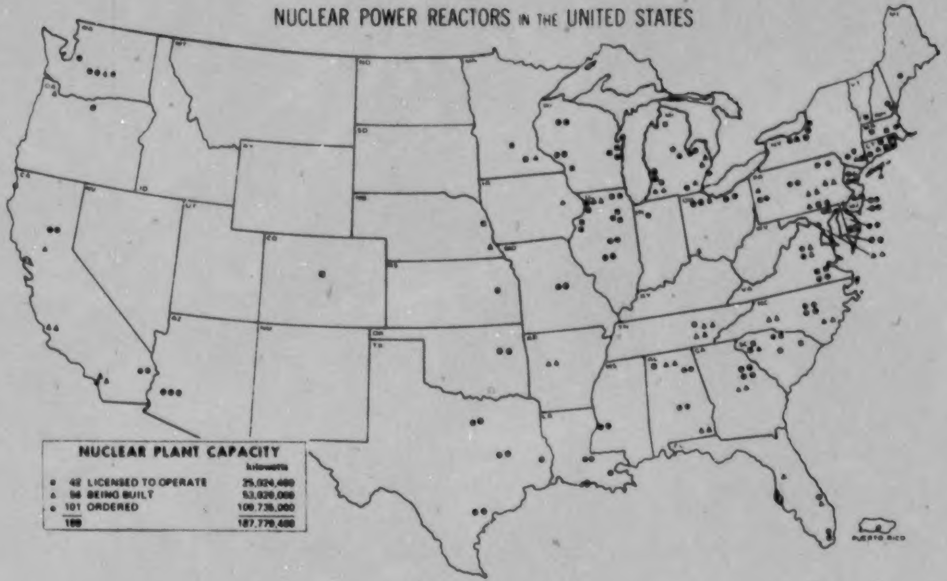
Country	Number of operating reactors total(LWR)			Gross electrical power generation 10^9 kwh total (LWR)			Average percent of capacity total (LWR)	
	Third qtr	Fourth qtr	Year total	Third qtr	Fourth qtr	Year total	Third qtr	Fourth qtr
Japan	7(6)	8(7)	15.08(14.10)	4.88(4.69)	4.40(4.20)	61(61)	72(73)	55(55)
Canada	5(0)	5(0)	15.41(--)	3.70(--)	3.59(--)	74(--)	70(--)	68(--)
Federal Republic of Germany	6(5)	6(5)	11.16(10.79)	2.36(2.32)	3.38(--)	57(57)	48(--)	68(67)
France	10(1)	9(1)	14.75(1.55)	2.73(.26)	4.27(.04)	57(82)	41(41)	64(--)
Great Britain	29(0)	29(0)	33.00(--)	7.08(--)	8.66(--)	61(63)	52(--)	64(--)
Italy	3(2)	3(2)	3.42(1.86)	.48(--)	.71(.54)	61(62)	34(22)	50(56)
Spain	3(2)	3(2)	6.94(3.45)	2.03(1.08)	2.03(1.00)	75(64)	84(79)	84(73)
Switzerland	3(3)	3(3)	7.04(7.04)	1.25(1.25)	2.15(2.15)	76(76)	54(54)	92(92)
United States	43(41)	42(42)	98.02(96.82)	36.34(35.29)	31.73(31.73)	57(57)	59(60)	56(56)

Source: Second and third quarters, Nuclear Assurance Corporation "Status of the Nuclear Industry," quarterly reports: fourth quarter, Nucleonics Week Magazine, November 23, 1974; December 26, 1974; January 23, 1974.

DOMESTIC FORECAST

(Source 22)

NUCLEAR POWER REACTORS IN THE UNITED STATES


NUCLEAR PLANT CAPACITY
kilowatts
● 42 LICENSED TO OPERATE 25,024,400
▲ 56 BEING BUILT 53,020,000
● 101 ORDERED 109,735,000
199 187,779,400
PUERTO RICO

(Source 14)

U. S. NUCLEAR POWER STATION STATUS

	December 31, 1973		1974		December 31, 1974	
	Units	MWe	Units	MWe	Units	MWe
Licensed to Operate	42	25,000	13	11,800	55	36,800
Retired	--	--	1	40	--	--
Under Construction	56	53,000	21	22,100	63	63,300
On Order	101	109,700	--	--	103	115,700
Ordered	--	--	30	35,600	--	--
Canceled	--	--	7	7,200	--	--
Deferred	--	--	114	--	--	--
	199	187,700			221	215,800
Scheduled Commercial Operation						
1980	140	121,600	--	--	110	93,100
1985	197	185,300	--	--	196	186,300
			Indefinite Schedule		16	18,800

	Case D Forecast (74)	Case M H Forecast (75)
1980	102,000	82,000
1985	250,000	205,000
1990	475,000	385,000

(Source 31)

-Nuclear powerplants in commercial operation: capacity, generation, and capacity factor

	Number in commercial operation	Capacity (MWe)	Net electricity generation (MWhe)	Industry capacity factor* (percent)
1974				
December	42**	27,136	11,538,670	60.0
November	40**	24,130	10,137,563	58.4
October	41	25,045	10,055,350	54.0
September	40	24,159	10,003,497	57.5
August	37	21,641	11,610,337	72.1
July	33	18,701	8,422,895	60.5

*Industry capacity factor = $\frac{\text{Gross electricity generated} \times 100 \text{ percent}}{\text{Design capacity} \times \text{hours during month}}$

**Peach Bottom 1 and Indian Point 1 (shutdown for 2½ years to install emergency core cooling system) not included in November and December figures.

Source: Nuclear Regulatory Commission, "Operating Units Status Report," monthly publication.

(Source 31)

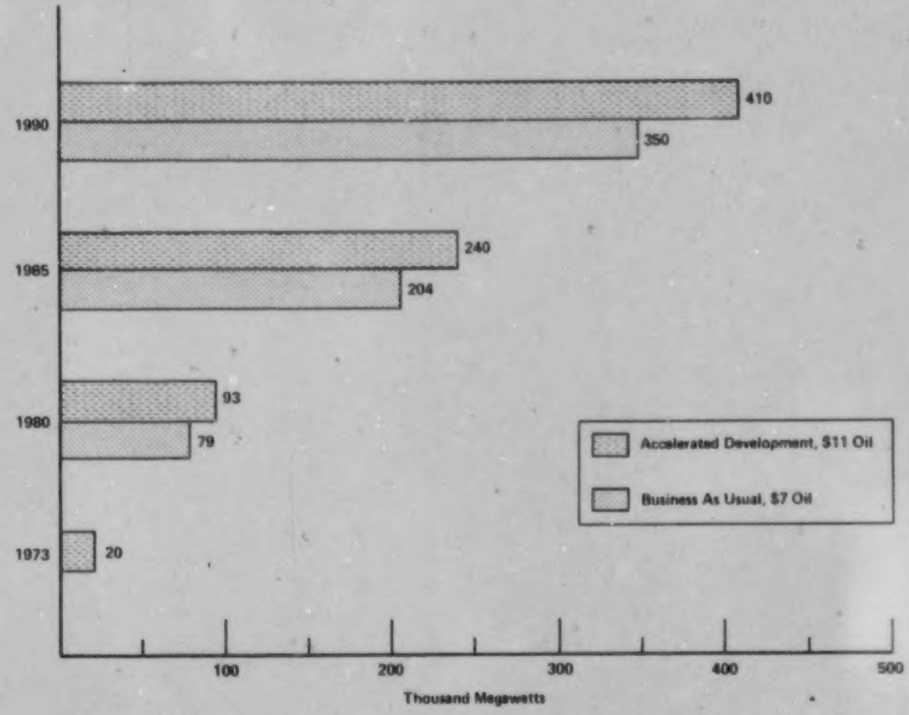
-Dates of expected commercial operation, nuclear powerplants with firm vendor commitments

Year of expected commercial operation	Fourth quarter 1974	
	Number of reactors	MWe
Previous to 1975	45	31,153
1975	12	10,284
1976	8	7,505
1977	7	6,749
1978	8	7,823
1979	11	12,145
1980	20	21,232
1981	22	23,660
1982	24	27,411
1983	19	21,155
1984	20	21,739
1985	13	14,730
1986	8	9,090
1987	7	7,379
1988	3	3,500
Total	227	225,555

Source: Summary of data from Nuclear Assurance Corporation, "Nuclear Industry Status," quarterly reports.

(Source 17)

Projected U.S. Nuclear Power Plant Capacity, 1973-90



(Source 31)

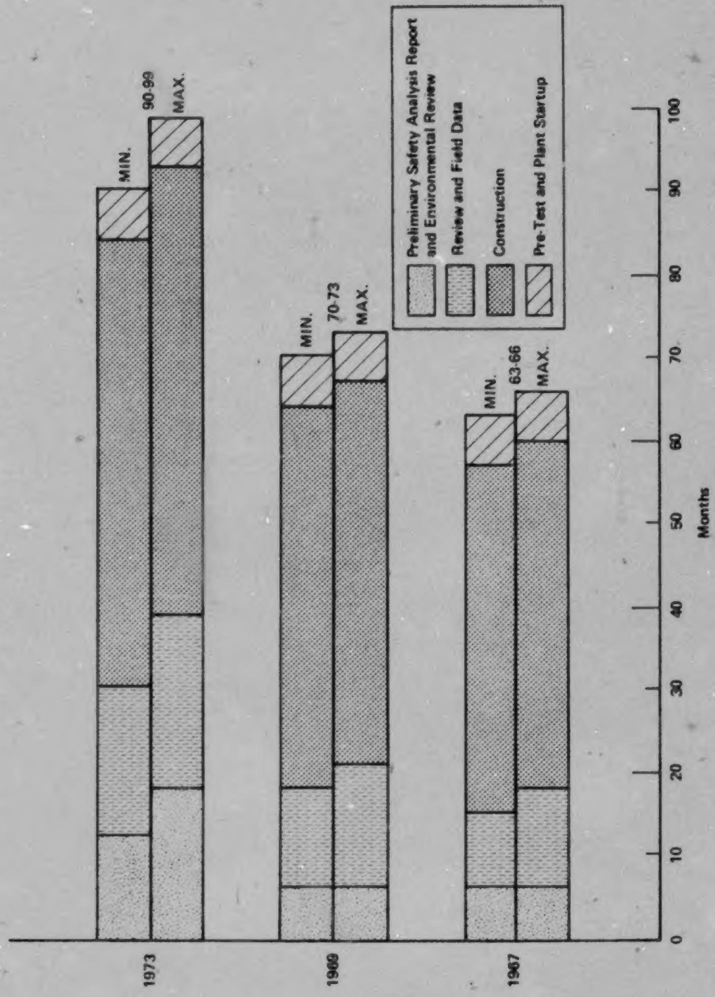
-Nuclear plant licensing: construction permit lead time

Quarter permit granted	Number of plants granted permits	Average construction permit lead time (months)
Fourth quarter 1974	12	29.6
Third quarter 1974	11	31.0
Second quarter 1974	3	42.7
First quarter 1974	0	No permits awarded
Fourth quarter 1973	4	36.0
Third quarter 1973	3	35.8

Source: Nuclear Assurance Corporation, "Nuclear Industry Status," quarterly reports.

(Source 17)

Nuclear Power Plant Lead Time Trends



(Source 32)

U. S. CENTRAL STATION NUCLEAR POWER REACTORS

Light Water Cooled and Moderated

Calendar Year	No. of Operating Units, Actual and Projected		
	BWR	PWR	TOTAL
1974	20	26	46
1975	24	36	60
1976	25	41	66
1977	25	47	72
1978	29	50	79
1979	34	59	93
1980	40	69	109
1981	49	80	129
1982	57	90	147
1983	61	103	164
1984	67	111	178

(Source 31)

-Nuclear powerplants fuel rod and assembly fabrication requirements and commitments,
(metric tons of uranium)

	Fuel rod and assembly fabrication			
	Requirements*		Commitments**	
	Fourth quarter		Fourth quarter	
Year	Annual	Cumulative	Annual	Cumulative
Previous to 1973	3,727		3,727	
1973	1,000	1,000	1,000	1,000
1974	754	1.754	754	1,754
1975	1,899	3,653	1,899	3,653
1976	1,735	5,388	1,687	5,340
1977	2,333	7,721	2,246	7,586
1978	2,544	10,265	2,270	9,856
1979	3,572	13,837	3,056	12,912
1980	4,300	18,137	3,416	16,328
1981	6,102	24,239	4,765	21,093
1982	5,450	29,689	3,742	24,835

*Requirements are for those powerplants with firm vendor contracts.

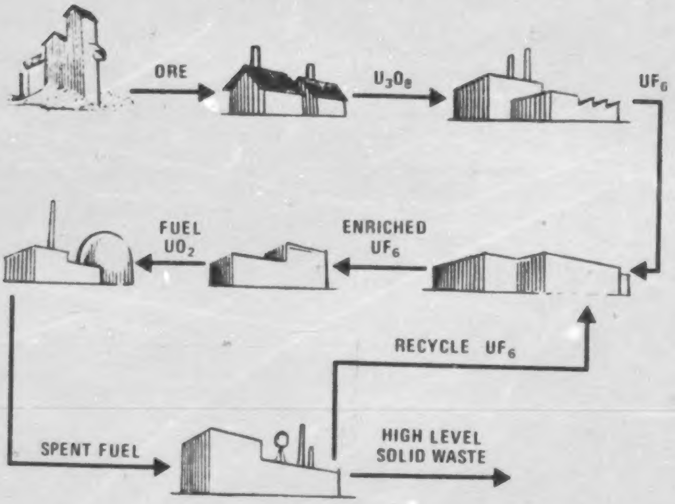
**Commitments are measured by contracts between any agent and fabricators.

Source: Nuclear Assurance Corporation, "Nuclear Fuel Status and Forecast," October 1974.

REACTOR AND FUEL CYCLE PARAMETERS

(Source 24)

NUCLEAR FUEL CYCLE


ORE
U3O8
UF6
ENRICHED UF6
FUEL UO2
RECYCLE UF6
SPENT FUEL
HIGH LEVEL SOLID WASTE

(Source 34)

NUCLEAR FUEL CYCLE

CAPITAL INVESTMENT REQUIREMENTS

	UNIT CAPACITY (ANNUAL)	UNIT COST ($ MILLION)	NUMBER OF REACTORS SUPPORTED	INVESTMENT PER REACTOR ($ MILLION)	TOTAL INVESTMENT FOR 200 REACTORS
EXPLORATION, MINING, AND MILLING	1000 TONS	$ 200	6.7	30	$ 6.0 BILLION
URANIUM ENRICHMENT	9 M SWU	3000	120	25	5.0 BILLION
FUEL FABRICATION	1500 MTU	100	50	2	0.4 BILLION
REPROCESSING	1500 MTU	500	50	10	2.0 BILLION
WASTE TREATMENT	1500 MTU	100	50	2	0.4 BILLION
WASTE STORAGE AND DISPOSAL	12,000 C.F.	100	200	5	0.1 BILLION
NUCLEAR POWER STATIONS	1000 MWE	750	1	750	150.0 BILLION
					~$ 164.0 BILLION

(Source 34)

POWER GENERATION COSTS

COST COMPONENT	LWR			COAL		
	UNIT COST	MILLS/KWH	ANNUAL COST FOR 200 GWe ($ IN MILLIONS)	UNIT COST	MILLS/KWH	ANNUAL COST FOR 200 GWe ($ IN MILLIONS)
URANIUM FEED (INCLUDING CONVERSION)	$14.50/LB U_3O_8	.82	$1,080			
URANIUM ENRICHMENT	$75/SWU	1.07	1,410			
FUEL FABRICATION	$70/KG U	.27	360			
SPENT FUEL TRANSPORTATION AND REPROCESSING	$110/KG U	.43	560			
WASTE TREATMENT, STORAGE & DISPOSAL	$7,000/CU FT	.05	60			
FUEL INVENTORY CARRYING CHARGE (@15%)		.87	1,140			
		3.51	4,610			
PLUTONIUM CREDIT	$18/GM	(.49)	640			
FUEL COST		3.02	3,970	69.5¢/MBTU ($15/TON)	6.6	$8,672

GENERATION COSTS IN 1982
(INCLUDING ESCALATION AT 8% FROM 1974)

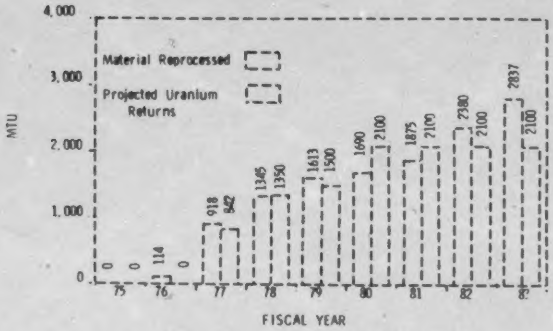
	LWR MILLS/KWH	LWR ANNUAL COST	COAL MILLS/KWH	COAL ANNUAL COST
FUEL COST	5.6	7,358	12.2	16,031
CAPITAL (15% ANNUAL FIXED CHARGE)	15.5	20,367	13.0	17,082
OPERATION & MAINTENANCE	1.5	1,971	3.7	4,862
TOTAL	22.6	29,696	28.9	37,975

A DIFFERENCE OF $8.3 BILLION PER YEAR (IN 1982 DOLLARS) FOR 200 GWe EQUATES TO AN ANNUAL SAVINGS OF ABOUT $40 MILLION PER 1000 MWe REACTOR ON LINE. SEVERAL UTILITIES ARE CURRENTLY ESTIMATING SAVINGS OF $50-80 MILLION PER REACTOR IN 1975.

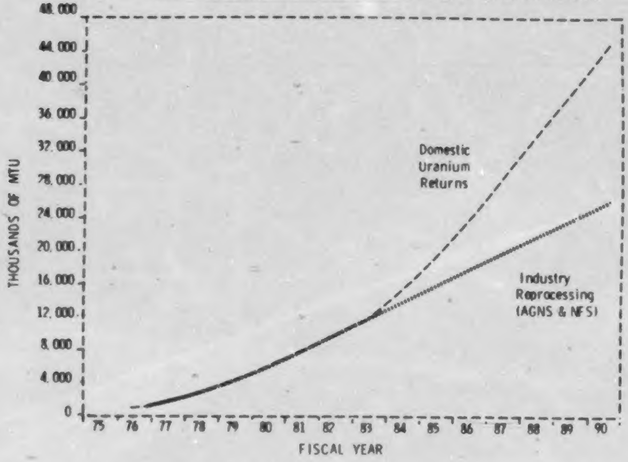
(Source 24)

PROJECTED ANNUAL URANIUM RETURNS VS. MATERIAL REPROCESSED

FY 1975 - FY 1983

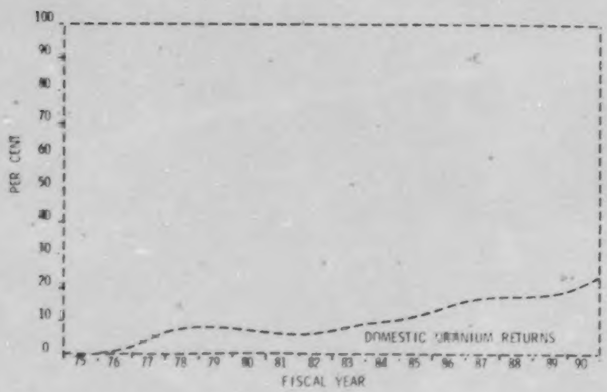


COMPARISON OF INDUSTRY REPROCESSING VS. DOMESTIC URANIUM RETURNS

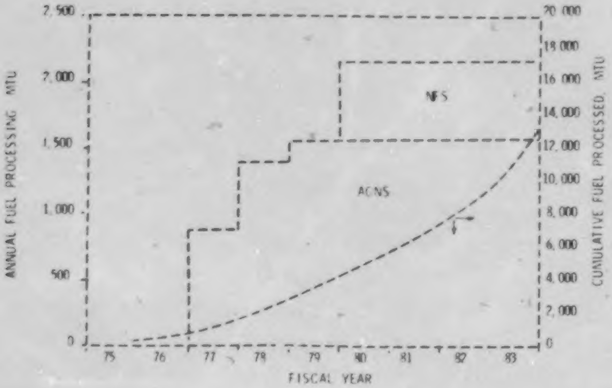


(Source 24)

PERCENT OF FEED REQUIREMENT PROVIDED BY DOMESTIC URANIUM RETURNS

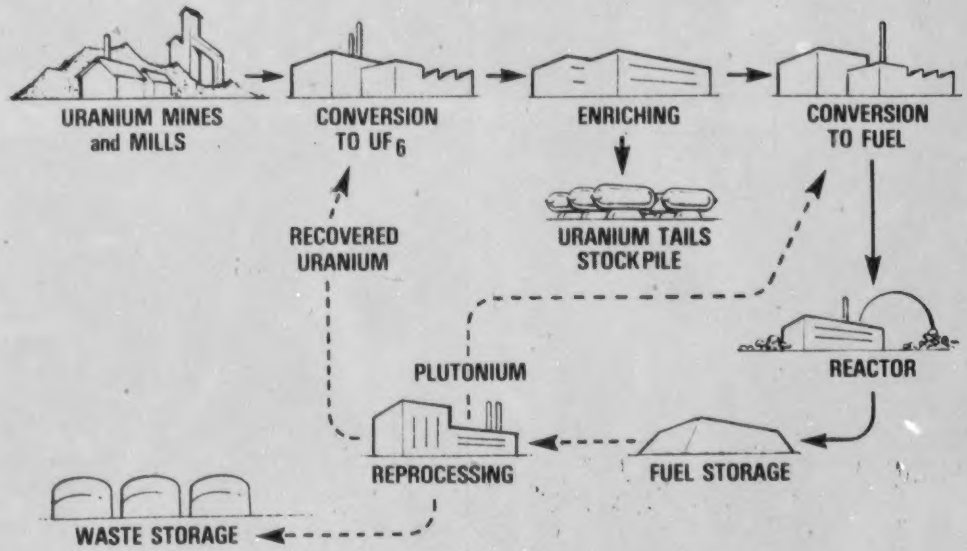


INDUSTRY PROCESSING PLANS



(Source 34)

The Light Water Reactor Nuclear Fuel Cycle


URANIUM MINES and MILLS
CONVERSION TO UF_6
ENRICHING
CONVERSION TO FUEL
URANIUM TAILS STOCKPILE
RECOVERED URANIUM
REACTOR
PLUTONIUM
REPROCESSING
FUEL STORAGE
WASTE STORAGE

(Source 31)

-Number of facilities in operation at each part of the nuclear fuel cycle, second, third, and fourth quarters of 1974

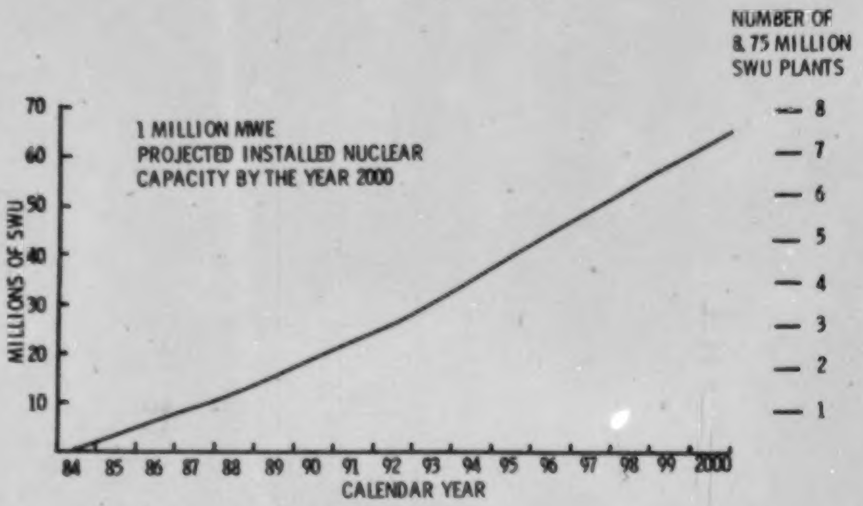
Parts of nuclear fuel cycel	Number of facilities in operation		
	Second quarter	Third quarter	Fourth quarter
Ore processing	14	14	14
U_3O_8-UF_6 conversion	2	2	2
Spent fuel reprocessing	0	0	0
Zirconium ingot production	2	2	2
Zirconium cladding production	5	5	5
Uranium enrichment	3	3	3
UO_6 powder production	7	7	7
Rod and assembly production	7	7	7
Nuclear powerplants*	46	50	53

*These data obtained from "Operating Units Status Report," Nuclear Regulatory Commission.

Source: "Nuclear Fuel Status and Forecast," Nuclear Assurance Corporation Quarterly.

(Source 23)

ANNUAL DOMESTIC SEPARATIVE WORK REQUIREMENTS
FOR NEW URANIUM ENRICHMENT PLANTS
FEBRUARY 1975 FORECAST
REFERENCE CASE
72% CAPACITY FACTOR



(Source 23)

FUEL CYCLE INTERRELATIONSHIPS

	NUMBER OF PLANTS		
	BASE CASE	20% LESS U_3O_8	ONE REPROCESSING PLANT DELAYED
URANIUM MILLS (EACH 1000 TONS U_3O_8/YR)	19	15.2	22.6
ENRICHMENT PLANTS (EACH 9 MILLION SWU/YR)	1	1.26	1.1
FUEL FABRICATION PLANTS (EACH 1100 MT/YR)			
ENRICHED U	2.4	2.4	2.6
PUO_2-UO_2	0.6	0.6	0.4
REPROCESSING PLANTS (EACH 1100 MT/YR)	3	3	2 (BUILD SPENT FUEL STORAGE CAPACITY)

(Source 24)

PROJECTED DIFFUSION PLANT POWER LEVELS
AND SEPARATIVE WORK AVAILABLE
VERSUS
SEPARATIVE WORK REQUIRED
FOR THE RECOMMENDED GDP OPERATING PLAN
ASSUMING SUPPLYING 364 GWE THROUGH FY 1982
AND 330 GWE THEREAFTER

Separative Work in Millions of SWU

DIFFUSION PLANT OPERATIONS	FY 1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Operating Tails Assay (Percent U-235)	0.30	0.30	0.28	0.275	0.275	0.30	0.30	0.30	0.335	0.335	0.335	0.30
Transaction Tails Assay (Percent U-235)	0.20	0.20	0.275	0.275	0.275	0.275	0.275	0.30	0.30	0.30	0.30	0.30
Average 3-Site Power Level (Megawatts)	3880	4867	5568	5714	6022	6374	6579	6579	6579	6748	7333	7380
Annual Separative Work Production	12.4	15.4	17.5	19.4	21.3	23.8	25.3	25.3	25.3	25.8	27.6	27.7
Included Separative Work												
From CIP		0.4	1.3	2.0	4.1	5.2	5.4	5.4	5.6	5.7	5.8	5.8
From CUP					0.6	1.8	2.9	2.9	2.9	3.1	4.7	4.7
SEPARATIVE WORK SUPPLY AND DEMAND (0.30 PERCENT TAILS ASSAY)												
Effective Annual Increment in Separative Work Available due to 0.30 Percent Tails Recycle and Evaluation at 0.30 Percent Tails Assay			(0.7)	(2.0)	(1.9)				1.6	1.7	2.0	
Cumulative Separative Work Available Including the July 1, 1974, Inventory of 14.2 Millions of Units	26.6	42.0	58.8	76.2	95.6	119.4	144.7	170.0	196.9	224.4	254.0	281.7
Annual Separative Work Required[1]	7.4	8.3	12.5	12.6	17.4	23.5	28.2	30.7	26.0	28.4	29.9	28.9
Cumulative Separative Work Required	7.4	15.7	28.2	40.9	58.3	81.8	110.0	140.7	166.7	195.1	225.0	253.9
Separative Work in Preproduction Inventories	19.2	26.3	30.6	35.3	37.3	37.6	34.7	29.3	30.2	29.3	29.0	27.8

---

[1] Covers projected domestic and foreign central station power demand, Government and other nonpower applications. Adjusted for advance sale of separative work to the Japanese.

SUMMARY OF PROJECTED NET SEPARATIVE WORK COMMITMENTS

Separative Work in Millions of SWU at 0.30% Tails Assay

FISCAL[2] YEAR	CENTRAL STATION POWER[1]							GOVERNMENT AND OTHER NON-POWER APPLICATIONS	TOTAL ANNUAL SEPARATIVE WORK REQUIREMENTS
	DOMESTIC			FOREIGN					
	REQUIREMENTS-TYPE	FIXED COMMITMENT	TOTAL	REQUIREMENTS-TYPE	FIXED COMMITMENT	TOTAL	TOTAL		
1975	3.0	1.1	4.1	1.5	0.9	2.4	6.5	0.9	7.4
1976	3.8	0.9	4.7	1.4	2.1	3.5	8.2	0.1	8.3
1977	5.2	1.8	7.0	3.7	1.8	5.5	12.5	0	12.5
1978	5.5	3.0	8.5	1.7	2.5	4.2	12.7	0	12.7
1979	5.5	5.2	10.7	2.7	4.6	7.3	18.0	(0.6)	17.4
1980	6.6	7.2	13.8	2.1	7.5	9.6	23.4	0.1	23.5
1981	6.5	11.0	17.5	2.1	7.6	9.7	27.2	1.0	28.2
1982	6.4	11.6	18.0	2.2	10.2	12.4	30.4	0.3	30.7
1983	6.5	9.5	16.0	2.1	6.9	9.0	25.0	1.0	26.0
1984	6.1	10.9	17.0	2.2	7.9	10.1	27.1	1.3	28.4
1985	6.0	11.7	17.7	2.2	8.6	10.8	28.5	1.4	29.9
1986	5.9	11.5	17.4	2.5	7.8	10.3	27.7	1.2	28.9

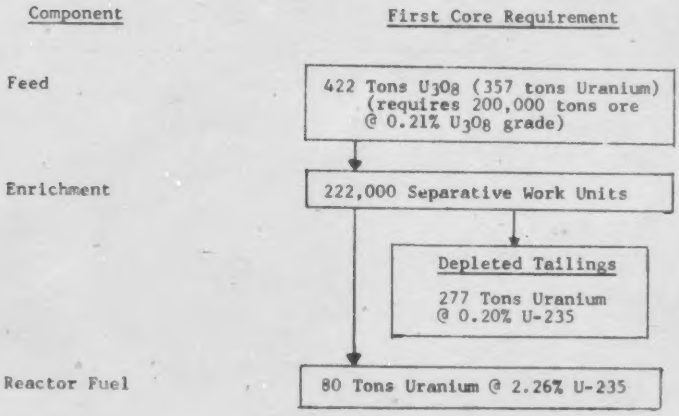
---

[1] Contracts covering 363,000 megawatts through FY 1982, 350,000 megawatts thereafter.
[2] July 1 through June 30 fiscal years.

(Source 22)

TYPICAL PRESSURIZED LIGHT-WATER REACTOR

1,000 MEGAWATT ELECTRIC CAPACITY


Component
First Core Requirement
Feed
422 Tons U_3O_8 (357 tons Uranium) (requires 200,000 tons ore @ 0.21% U_3O_8 grade)
Enrichment
222,000 Separative Work Units
Depleted Tailings
277 Tons Uranium @ 0.20% U-235
Reactor Fuel
80 Tons Uranium @ 2.26% U-235

(Source 39)

—SUMMARY OF GAS COOLED REACTOR PLANT CHARACTERISTICS

	Peach Bot. 1	Vrain Fort St.	Commercial HTGR reactor offerings 770 Mwe	 1160 Mwe	 1540 Mwe	Direct cycle gas turbine
POWER						
MWt	115	842	2,000	3,000	4,000 *	3,000
Mwe Net	40	330	770	1,160	1,540	1,062
Efficiency (net) percent	34.7	39.2	38.5	38.7	39	35.6
HELIUM						
Pressure, psia	335	700	700	700	700	1,000
Reactor Outlet, °F	1,342	1,427	1,366	1,366	1,366	1,500
STEAM						
Press. psig	1,450	2,400	2,400	2,400	2,400	Not applicable
Temp. °F	1,000	1000/1,000**	950/1,000**	950/1,000**	950/1,000**	Not applicable
CORE						
Mod. Mat'l.	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite
Fuel Mat'l.	PyC Coat. Part.	PyC SiC Coat Part.	PyC & PyC/SiC Coat Part.	PyC & PyC/SiC Coat Part.	PyC & PyC/SiC Coat Part.	PyC & PyC SiC Coat Part.
Fuel Design	Vented	Non-Vented	Non-Vented	Non-Vented	Non Vented	Non-Vented
Coolant Flow Contr.	None	Var. orifices	Var. orifices	Var. orifices	Var. orifices	Var. orifices
Coolant Flow Dir.	Up	Down	Down	Down	Down	Down
STEAM GENERATOR						
Type	Recirc.	Once thru	Once thru	Once thru	Once thru	Not applicable
Location	Outside vessel	Under core	Side of core	Side of core	Side of core	Not applicable
HELIUM						
Type/No. of compressors	Centrl./2	Axial/4	Axial/4	Axial/6	Axial/8	Axial/3
CIRCULATOR						
Drive Elec. Motor	Elec. Motor	St turbine	St turbine	St turbine	St. turbine	Not applicable
Bearings	Oil	Water	Water	Water	Water	
REACTOR VESSEL	Steel	CRV (Tendon)	PCRV (Wire Wrap)	PCRV (Wire Wrap)	PCRV (Wire Wrap)	PCRV (Wire Wrap)
SECONDARY CONTAINMENT	St. shell	Second. Clos. on PCRV prim. containment pentrs.	Reinforced conc. of post tension conc.	Reinforced conc. or post tension conc.	Reinforced conc. of post tension conc.	Post tension conc.
AUXILIARY						
Type/No. of drives	None	None	Centrif./2	Centrif./3	Centrif./3	Centrif./3
CIRCULATOR						
Drive	—	—	Elec. motor	Elec. motor	Elec. motor	Elec. motor
Bearings	—	—	Oil	Oil	Oil	Oil

* GAC is currently offering this size at 4000 MWt, but current AEC regulations limit the thermal power to 3800 MWt.

** Main steam/reheat temperature

UNITED STATES DEMAND

(Source 31)

--Inventories of nuclear material

Materials	Sept. 1973	Dec. 1973	March 1974	June 1974	Sept. 1974	Dec. 1974
Natural uranium, MTU*	11,480	15,375	15,015	16,477	NA	12,836
Enriched UF_6, MTU at fabricators	155	147	150	85	NA	202
at enrichment plants** for commercial use	NA	3,170	3,333	3,653	3,965	NA
Uranium in unused assemblies, MTU	616	530	530	300	NA	293
Reprocessed uranium, MTU	254	254	254	254	254	254
Reprocessed total plutonium, kg	1,217	1,217	1,217	1,217	1,217	1,217

*Metric tons of uranium.

**ERDA is source of data on inventories at enrichment plants; other inventory data from Nuclear Assurance Corporation.

Source: Nuclear Assurance Corporation, "Nuclear Industry Status," quarterly reports.

MISCELLANEOUS DATA

(Source 39)

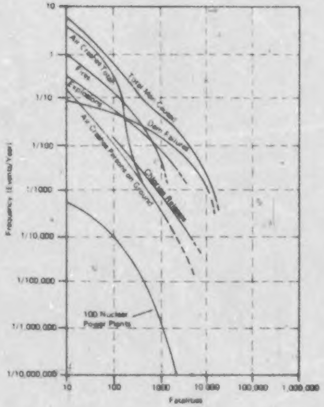


Figure 6–1. Frequency of Fatalities Due to Man-Caused Events *

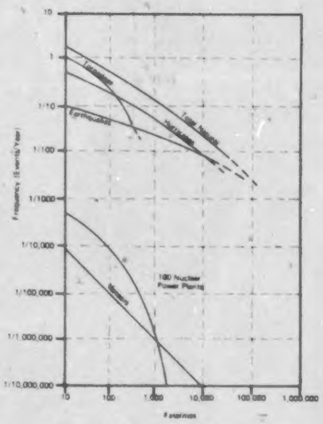


Figure 6–2. Frequency of Fatalities Due to Natural Events

---

*An example of the numerical meaning of Figures 6–1 to 6–3 can be seen by selecting a vertical consequence line and reading the likelihood that various types of accidents would cause that consequence. For instance, in Figure 6–1, 100 plants would cause this consequence with a likelihood of one in 10,000 per year. Chlorine releases are about 100 times more likely, or about one in 100; fires are about 1,000 times more likely, or about one in 10 per year; air crashes are about 5,000 times more likely, or about one per 2 years. (Excerpted from Summary Report WASH-1400 Draft pg. 3.)

Table 6.1—RISK OF FATALITY BY VARIOUS CAUSES

Accident type	Total number	Individual chance per year
Motor Vehicle	55,791	1 in 4,000
Falls	17,827	1 in 10,000
Fires and Hot Substances	7,451	1 in 25,000
Drowning	6,181	1 in 30,000
Firearms	2,309	1 in 100,000
Air Travel	1,778	1 in 100,000
Falling Objects	1,271	1 in 160,000
Electrocution	1,148	1 in 160,000
Lightning	160	1 in 2,000,000
Tornadoes	91	1 in 2,500,000
Hurricanes	93	1 in 2,500,000
All Accidents	111,992	1 in 1,600
Nuclear Reactor Accidents (100 Plants)	0	1 in 300,000,000

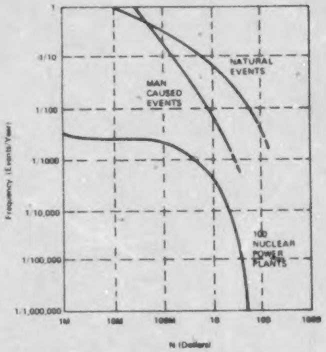


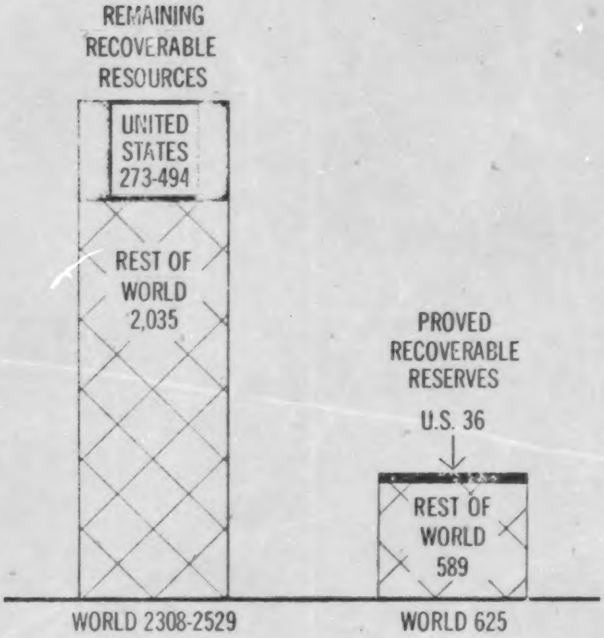
Figure 6–3. Frequency of Property Damages Due to Natural and Man-Caused Events

OIL
UNITED STATES AND FOREIGN STATISTICS

(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR PETROLEUM

(Billion Barrels)



(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR PETROLEUM
(Including Crude Petroleum and Natural Gas Liquids)

	Billion Barrels	Quadrillion Btu
Remaining Recoverable Resources 1/		
United States	273-494	1,469-2,657
Rest of World	2,035	10,956
World	2,308-2,529	12,425-13,613
Proved Recoverable Reserves 2/		
United States	36	194
Rest of World	589	3,169
World	625	3,363

1/ Estimated remaining recoverable resources, discovered and undiscovered, that could be made available under certain economic and technological conditions.

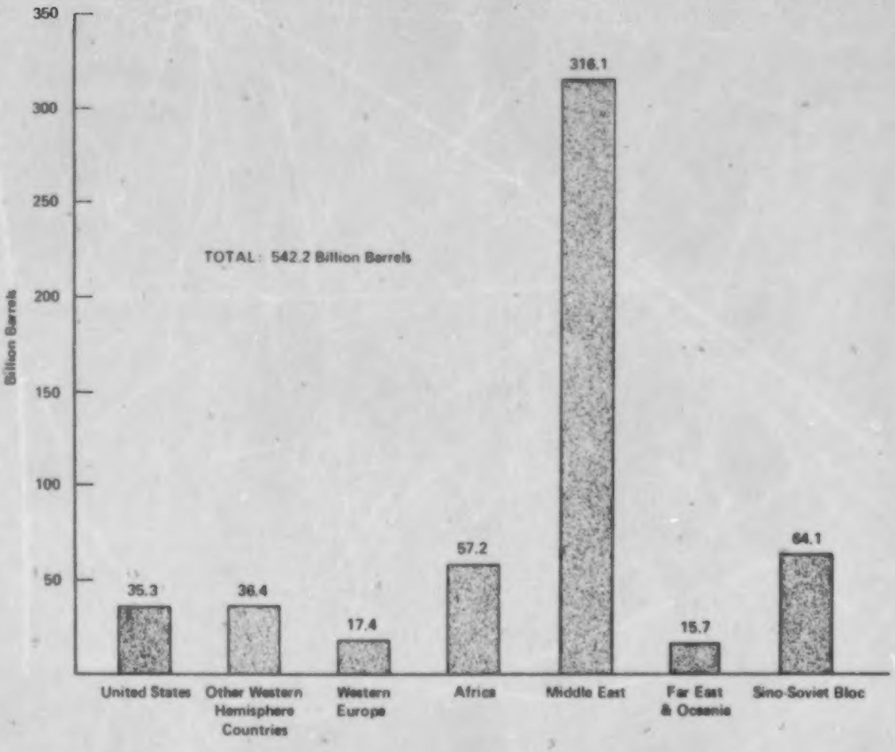
2/ Proved reserves are those recoverable under existing economic and operating conditions as reported by the American Petroleum Institute, December 31, 1973.

Sources: Reserves of ... Crude Oil and Natural Gas Liquids in the United States, American Petroleum Institute, Vol. 26, 1972; Energy Resources of the United States, U.S. Geological Survey, Circular 650, U.S. Geological Survey, Washington, D.C., 1972; Summary Petroleum and Selected Mineral Statistics for 120 Countries... Geological Survey Professional Paper 817, 1973; Commodity Data Summaries Bureau of Mines, U.S. Department of the Interior 1974; U.S. Department of Interior, Press Release Geological Survey March 26, 1974.

Prepared by: Office of Economics, Federal Power Commission.

(Source 17)

World Crude Oil Reserves, by Region, 1973



(Source 16)

World crude oil production, by countries, 1974 and 1973

(Source: Various private and government agency sources or estimated by WORLD OIL)

Continent and country	Annual production (thousand barrels) 1973	Annual production (thousand barrels) 1974	Daily production (barrels) 1973	Daily production (barrels) 1974	% diff.*
North America	4,142,910	4,032,928	11,350,177	11,049,104	(2.7)
Canada	625,659	631,170	1,714,134	1,729,233	0.9
Mexico	164,881	191,808	451,728	525,501	16.3
United States	3,353,370	3,209,920	9,187,315	8,794,282	(4.3)
West Indies	62,166	61,061	170,318	167,427	(1.7)
Barbados	N/A	65	N/A	178	N/A
Trinidad & Tobago	60,670	59,480	166,218	163,013	(1.9)
Others	1,496	1,546	4,100	4,236	3.3
South America	1,641,876	1,496,176	4,498,289	4,099,118	(8.9)
Argentina	153,652	152,060	420,964	416,604	(1.0)
Bolivia	17,265	17,274	47,300	47,326	0.06
Brazil	62,119	64,751	170,189	177,400	4.2
Chile	11,410	10,105	31,260	27,685	(11.4)
Colombia	66,852	61,370	183,156	168,137	(8.2)
Ecuador	76,221	71,542	208,825	196,005	(6.1)
Peru	25,796	26,310	70,682	72,082	2.1
Venezuela	1,228,594	1,092,780	3,366,011	2,993,918	(11.1)
Western Europe	110,542	115,624	302,855	316,777	4.6
Austria	17,885	16,040	49,000	43,945	(10.3)
France	9,169	7,878	25,122	21,583	(14.1)
Germany, West	48,545	45,505	133,000	124,671	(6.3)
Italy	6,881	6,932	18,852	18,992	0.7
Netherlands	10,425	10,905	28,563	29,878	4.6
Norway	11,782	13,200	33,000	36,164	9.6
Spain	5,183	13,842	14,200	37,922	167.1
United Kingdom	669	655	1,833	1,796	(2.0)
Others	N/A	663	N/A	1,816	N/A
Eastern Europe	3,261,281	3,529,186	8,934,784	9,669,464	8.2
Albania	14,300	16,012	39,178	43,870	12.0
Bulgaria	1,466	1,096	4,016	3,004	(25.2)
Czechoslovakia	1,220	1,085	3,342	2,973	(11.0)
Germany, East	1,442	1,484	3,950	4,065	2.9
Hungary	15,300	15,260	41,918	41,808	(0.3)
Poland	2,770	3,710	7,589	10,163	33.9
Rumania	106,130	105,832	290,767	289,952	(0.3)
U.S.S.R.	3,094,000	3,358,950	8,476,712	9,202,603	8.6
Yugoslavia	24,600	25,950	67,397	71,096	5.4
Africa, northern	1,283,259	1,016,636	3,515,779	2,785,304	(20.7)
Algeria	399,675	340,829	1,095,000	933,778	(14.7)
Egypt	60,482	51,968	165,705	142,377	(14.1)
Libya	792,780	592,643	2,172,000	1,623,679	(25.2)
Morocco	321	360	879	986	12.4
Tunisia	29,998	30,836	82,185	84,482	2.8
Africa, central & southern	874,844	986,055	2,396,833	2,701,521	12.7
Cabinda	58,650	61,251	160,685	167,811	4.4
Congo	13,480	22,434	36,931	61,463	66.4
Gabon	55,045	72,450	150,808	198,493	31.6
Nigeria	747,669	829,930	2,048,408	2,273,784	11.0
Asia, Middle East	7,765,444	7,897,810	21,275,192	21,637,813	1.7
Abu Dhabi	482,239	528,062	1,321,202	1,446,745	9.5
Bahrain	24,948	24,587	68,351	67,360	(1.4)
Dubai	80,300	91,344	220,000	250,258	13.8
Iran	2,139,269	2,218,370	5,861,011	6,077,726	3.7
Iraq	736,643	708,036	2,018,201	1,939,822	(3.9)
Israel	40,460	37,082	110,848	101,596	(8.3)
Kuwait	1,004,780	781,097	2,752,823	2,139,992	(22.3)
Neutral Zone	192,227	194,513	526,650	532,911	1.2
Oman	106,925	105,974	292,946	290,340	(0.9)
Qatar	207,900	116,164	569,589	318,257	(44.1)
Saudi Arabia	2,677,146	3,023,286	7,334,647	8,282,975	12.9
Syria	47,450	40,252	130,000	110,279	(15.2)
Turkey	25,157	25,064	68,924	68,668	(0.4)
Asia, Far East	332,344	530,825	910,532	1,454,318	59.7
Burma	7,811	7,463	21,400	20,447	(4.5)
China, Mainland	262,800	459,900	720,000	1,260,000	75
India	52,925	54,319	145,000	148,820	2.6
Japan	5,141	5,146	14,085	14,100	....
Pakistan	2,608	2,600	7,145	7,123	(0.3)
Taiwan	1,058	1,330	2,900	3,644	25.7
Thailand	N/A	67	N/A	184	N/A
Oceania	748,918	758,747	2,051,833	2,078,756	1.3
Australia	142,350	141,461	390,000	387,564	(0.6)
Brunei	83,668	73,340	229,227	200,932	(12.3)
Indonesia	488,537	515,573	1,338,448	1,412,530	5.5
Malaysia	33,080	26,982	90,630	73,922	(18.4)
New Zealand	1,288	1,391	3,530	3,810	7.9
Total	20,224,502	20,494,444	55,409,595	56,149,163	1.3

* ( ) denotes minus percentage.

(Source 6)

U.S. IMPORTS OF CRUDE OIL BY COUNTRY OF ORIGIN
(DAILY AVERAGES IN THOUSANDS OF 42 GALLON BARRELS)

Country of Origin	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Algeria	6	9	4	4	5	1	6	13	87	120
Angola	—	—	—	—	—	1	—	3	15	49
Argentina	—	—	—	—	—	—	—	—	1	—
Australia	—	—	—	—	—	—	—	7	1	—
Bolivia	—	—	3	19	19	16	2	2	—	3
Canada[1]	278	295	347	412	463	557	672	722	854	1,001
Chile	—	—	—	2	5	4	—	1	—	—
Colombia	26	42	40	32	33	42	20	9	4	2
Ecuador	—	—	—	—	—	—	—	—	15	47
Egypt	3	2	2	4	29	40	21	19	8	15
Gabon	—	—	—	2	—	—	—	—	—	—
Indonesia	63	61	50	62	73	89	70	110	163	200
Iran	66	78	84	65	58	42	33	106	136	217
Iraq	—	16	26	5	—	—	—	11	4	4
Kuwait	63	55	26	19	43	34	33	29	36	42
Libya	39	41	69	42	114	134	47	53	109	133
Malaysia	—	—	—	—	—	—	—	—	3	—
Mexico	10	7	—	—	—	—	—	—	—	1
Neutral Zone	48	27	19	11	29	43	—	—	—	—
Nigeria	—	15	11	4	8	49	48	95	243	448
Peru	—	—	—	—	—	1	—	—	—	—
Qatar	20	12	1	—	—	1	—	—	3	7
Saudi Arabia	97	132	126	81	52	35	40	115	174	462
Trinidad	—	—	—	—	—	—	1	—	24	60
Tunisia	—	—	—	—	—	—	—	3	7	18
U.S.S.R.	—	—	—	—	—	—	—	—	1	—
United Arab Emirates[2]	3	14	13	5	15	14	63	80	73	71
Venezuela	476	432	404	359	344	306	268	303	255	344
U. S. Total[3]	1,198	1,238	1,225	1,128	1,290	1,409	1,324	1,681	2,216	3,244

[1] Includes some Athabasca hydrocarbons.

[2] Abu Dhabi prior to 1972.

[3] Excludes crude oil delivered to Foreign Trade Zone.

Source: Bureau of Mines, *Petroleum Statement*, Annual and December issues.

(Source 28)

Imports of crude petroleum into the United States, by months, [illegible]

(Thousands of barrels)

[illegible]

(Source 6)

U.S. EXPORTS OF CRUDE OIL BY COUNTRY OF DESTINATION

(DAILY AVERAGES IN THOUSANDS OF 42 GALLON BARRELS)

Country	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Bahamas	–	–	–	–	–	–	4	–	–	–
Belgium	–	–	–	1	–	–	–	–	–	–
Canada	–	–	–	10	–	–	1	–	–	–
Denmark	–	–	–	1	–	–	–	–	–	–
Italy	–	–	–	1	–	–	–	–	–	–
Jamaica	–	–	–	–	–	–	–	1	–	–
Japan	3	1	2	2	3	2	1	–	1	1
Mexico	–	1	1	–	–	–	–	–	–	–
Netherlands	–	–	–	2	–	–	–	–	–	–
Spain	–	–	–	2	–	–	–	–	–	–
Trinidad and Tabago	–	–	–	2	1	1	8	–	–	–
United Kingdom	1	1	1	46	1	1	–	–	–	–
West Germany	–	–	–	6	–	–	–	–	–	–
Total	4	3	4	73	5	4	14	1	1	1

Source: Bureau of the Census, Department of Commerce

EXPORTS OF MAJOR REFINED PRODUCTS[1] FROM THE U.S. BY COUNTRY OF DESTINATION

(DAILY AVERAGES IN THOUSANDS OF 42 GALLON BARRELS)

Country	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Argentina	–	–	–	–	1	–	–	–	–	1
Australia	1	–	–	–	–	–	–	–	–	–
Bahamas	–	–	–	–	–	2	2	1	2	–
Belgium	–	1	–	–	–	–	1	–	1	–
Brazil	–	–	–	1	1	1	1	1	1	1
Canada	17	17	19	26	23	24	14	11	10	10
Denmark	–	1	–	–	–	–	–	–	1	1
France	1	1	–	–	1	1	–	–	–	–
French Pacific Islands	1	1	1	1	2	1	1	1	–	1
Gabon	–	–	–	–	–	–	–	1	–	–
Germany, West	1	1	2	2	2	1	–	–	–	–
Greece	1	–	–	–	–	–	–	–	1	–
India	–	–	–	–	–	–	–	1	–	–
Italy	3	2	2	1	2	4	3	2	3	2
Jamaica	–	–	–	–	–	–	–	4	–	2
Japan	33	21	13	24	22	9	26	8	2	–
Leeward & Windward Is.	–	–	–	–	–	–	–	–	1	–
Mexico	9	7	15	11	5	7	6	12	6	11
Netherlands	4	4	4	5	4	2	3	1	2	2
Netherlands Antilles	10	6	2	2	–	–	–	1	1	3
Panama	–	–	–	–	–	–	–	–	2	1
Peru	1	–	–	3	1	2	–	1	–	–
Philippine Republic	–	–	–	–	–	–	–	1	1	–
Puerto Rico	–	–	–	–	–	–	–	–	1	–
Singapore	–	–	–	–	–	–	–	1	–	–
South Africa, Republic of	1	–	1	1	2	1	1	1	1	–
Spain	–	–	–	–	–	–	1	–	1	–
Sweden	2	–	–	–	–	–	–	–	1	–
United Kingdom	4	3	4	8	5	7	5	2	4	3
Venezuela	–	–	–	–	–	–	–	–	–	1
Other Countries	–	4	1	6	2	–	1	3	–	4
Total Major Products	89	69	64	91	73	62	65	53	42	43

[1] Includes motor gasoline, aviation gasoline, special naphthas, kerosine, distillate fuel oil, and residual fuel oil.

Source: Bureau of Mines, *Minerals Yearbook*

(Source 16)

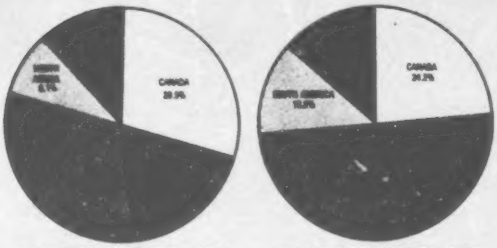
U.S. statistical summary for 1973 and 1974 and forecasts for 1975

ITEM (Thousand barrels daily)	1973*	1974	% Diff. '73-'74	1975 Forecast	% Diff. '74-'75
NEW SUPPLY					
Total new supply	17,156	16,756	− 2.3	16,129	−3.7
Production	10,955	10,529	− 3.9	10,265	−2.5
Crude oil	9,187	8,794	− 4.3	8,570	−2.5
Natural gas liquids	1,768	1,735	− 1.9	1,727	−0.46
Imports	6,201	6,227	+ 0.4	5,864	−5.8
Crude oil	3,243	3,505	+ 8.0	3,278	−6.5
Refined products	2,958	2,722	− 8.0	2,586	−5.0
STOCK CHANGES					
Stock changes all oils	+112	+381	......	....	....
DEMAND					
Total demand	17,044	16,375	− 3.9	16,129	−1.5
Gasoline (inc. aviation gas)	6,722	6,566	− 2.3	6,486	−1.2
Kerosine (inc. kero.-type jet fuels)	1,052	950	− 9.7	943	−0.7
Distillate fuel oil	3,089	3,090	......	3,028	−2.0
Residual fuel oil	2,819	2,634	− 6.6	2,594	−1.5
Other oils	3,362	3,135	− 6.8	3,078	−1.8
Exports	230	218	− 5.2	218	....
Crude oil	2	2	......	2	....
Refined products	228	216	− 5.7	216	....
REFINERY RUNS					
Crude runs to stills	12,430	12,550	......	12,450	−0.8
DRILLING					
Total wells completed	26,394	33,708	+27.7	....	....
New wells completed	26,081	33,470	+28.3	35,944	+7.4
Oil	9,555	13,719	+43.6	14,645	+6.8
Gas	5,894	7,032	+19.3	7,550	+7.4
Dry	10,017	11,867	+18.5	....	....
Service	615	852	+38.5	....	....
Old wells deepened	313	238	−24.0	....	....
Wildcats completed	5,545	6,730	+21.4	7,270	+8.0
Productive	812	919	+13.2	....	....
Oil	379	438	+15.6	....	....
Gas	433	481	+11.1	....	....
Dry	4,733	5,811	+22.8	....	....
Thousand feet drilled	134,578,477	162,372,103	+20.7	....	....
New wells	134,204,790	162,076,636	+20.8	174,083,250	+7.4
Development	99,047,852	120,213,379	+21.4	....	....
Wildcat	33,192,355	39,213,379	+19.6	....	....
Service	1,964,583	2,169,618	+10.4	....	....
Old wells deepened	373,687	295,467	−20.9	....	....
RIGS					
Rigs operating, year end	1,675	1,854	+10.7	....	....
Monthly average	1,435	1,697	+18.3	....	....
PRODUCING WELLS					
Oil wells prod., year end	499,968	494,352	− 1.1	....	....
Flowing	35,867	36,105	+ 0.7	....	....
Artificial lift	464,101	458,247	− 1.3	....	....
Gas wells prod., year end	123,034	126,987	+ 3.2	....	....

* Revised

(Source 16)

HOW U.S. CRUDE IMPORT SOURCES ARE CHANGING . . .



U.S. SUPPLIER RANKING, 1973   U.S. SUPPLIER RANKING, 1974

(Source 16)

1975 world drilling forecasts*

REGION	Wells forecast 1975	Estimated wells completed 1974	Percent change
Mexico	**470**	**401**	**+17.2**
Central America	**15**	**8**	**+87.5**
West Indies	**265**	**225**	**+17.7**
South America	**1,784**	**1,649**	**+ 8.2**
Argentina	590	585	+ 0.9
Brazil	243	175	+38.9
Ecuador	45	40	+12.5
Peru	170	127	+33.9
Venezuela	600	595	+ 0.8
Other South America	136	127	+ 7.0
Middle East	**824**	**745**	**+10.6**
Abu Dhabi	110	100	+10.0
Iran	100	90	+11.1
Neutral Zone	27	15	+80.0
Saudi Arabia	352	348	+ 1.1
Other Middle East	235	192	+22.4
Western Europe	**545**	**490**	**+11.2**
Austria	80	76	+ 5.3
France	20	18	+11.1
Germany, West	60	55	+ 9.1
Italy-Sicily	45	41	+ 9.8
Netherlands	80	68	+17.6
Norway	45	38	+18.4
U.K.	150	139	+ 7.9
Other West Europe	65	55	+18.2
Africa	**767**	**636**	**+20.6**
Algeria	140	71	+97.2
Egypt	90	78	+15.4
Libya	71	66	+ 7.6
Nigeria	272	264	+ 3.0
Gabon	70	66	+ 6.1
Other Africa	124	91	+36.3
Far East-Oceania	**1,140**	**1,047**	**+ 8.8**
Australia	45	59	−23.7
Brunei	49	49	0.0
Indonesia	767	697	+10.0
Malaysia	55	44	+25.0
Other Far East-Oceania	224	198	+13.1
Total	**5,810**	**5,201**	**+11.7**

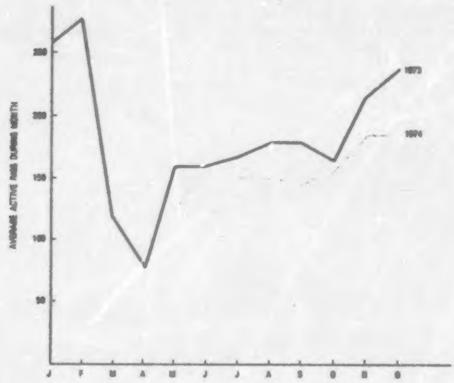
* Excludes U.S., Canada, Russia, Eastern Europe, People's Republic of China.

(Source 16)

1975 Canadian drilling forecast

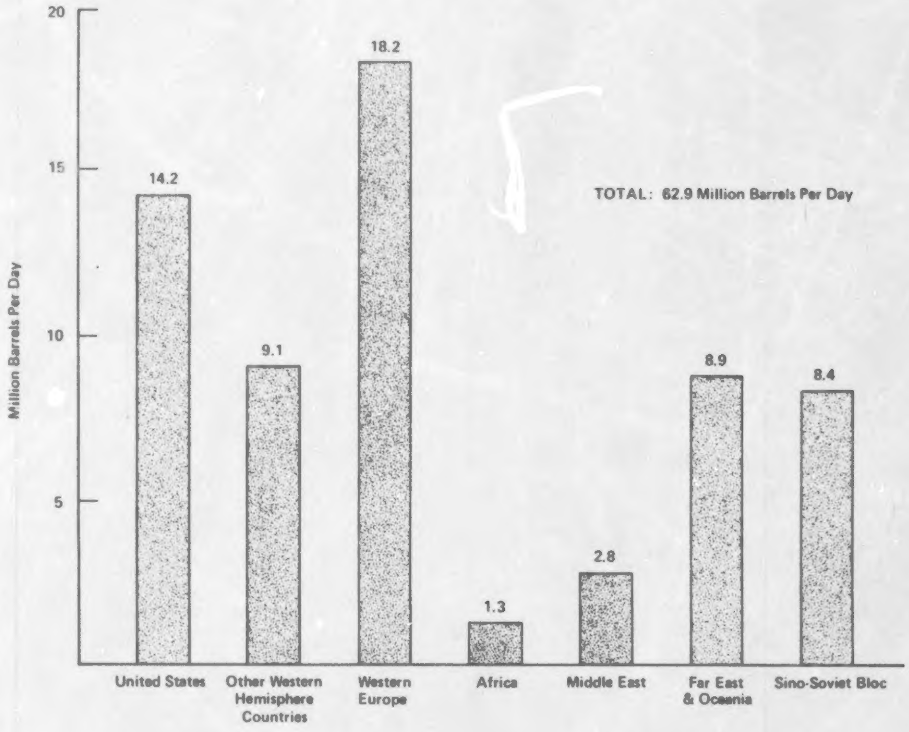
ITEM	Western Canada	Eastern Canada	Total Canada
Wells forecast, 1975	3,937	104	4,041
Wells drilled, 1974	4,087	*108	4,195
Percent change	−3.7%	−3.7%	−3.7%
Footage forecast, 1975	13,976,350	353,600	14,329,950
Footage drilled, 1974	14,449,737	*366,933	14,816,670
Percent change	−3.3%	−3.6%	−3.3%

* Estimate



(Source 17)

World Petroleum Refining Capacity, 1973



UNITED STATES RESERVES

(Source 16)

Estimated reserves of crude oil in the United States

(Thousands of barrels of 42 U.S. gallons)

Changes in proved reserves during 1973

(Source: American Petroleum Institute—American Gas Association Joint Report, Vol. 28, June 1974)

State	Proved Reserves as of 12/31/72	Proved Reserves as of 12/31/73	Percent Change	Indicated Additional Reserves from Known Reservoirs†
Alabama	56,734	53,443	− 6	22,041
Alaska	10,096,282	10,112,213	+ 2	36,000
Arkansas	113,100	105,553	− 7	21,444
California*	3,553,735	3,488,100	− 2	1,560,150
Coastal Region	513,322	536,284	+ 5	202,750
Los Angeles Basin	1,282,048	1,197,868	− 7	418,000
San Joaquin Basin	1,758,365	1,753,948	+ 0.2	939,400
Colorado	326,411	304,790	− 7	93,790
Florida	208,149	183,859	−12	161,203
Illinois	174,883	152,343	−13	6,500
Indiana	29,383	26,622	− 9	2,800
Kansas	453,394	401,069	−12	1,500
Kentucky	48,193	39,900	−17	3,000
Louisiana*	5,028,478	4,576,826	− 9	233,877
North	281,451	252,388	−10	31,645
South	4,747,027	4,324,438	− 9	202,232
Michigan	62,002	72,444	+17	7,500
Mississippi	312,458	291,049	− 7	22,952
Montana	241,248	219,343	− 9	51,420
Nebraska	30,553	28,166	− 8	4,145
New Mexico	582,593	642,994	+10	319,510
Northwest	24,246	23,860	− .2	4,025
Southeast	558,347	619,134	+11	315,485
New York	9,246	8,288	−10	2,000
North Dakota	166,033	179,520	+ 8	14,670
Ohio	127,385	124,911	− 2	....
Oklahoma	1,303,004	1,270,964	— 2	261,000
Pennsylvania	37,345	39,613	+ 6	54,770
Texas*	12,144,057	11,756,613	− 3	2,083,344
District 1	147,324	144,149	− 2	36,702
District 2	638,768	677,125	+ 6	5,720
District 3	1,536,426	1,489,428	− 3	31,928
District 4	343,752	304,422	−11	38,865
District 5	98,963	126,462	+28	36,000
District 6	2,208,438	2,049,248	− 7	199,055
District 7-B	235,962	235,870	− 0.04	10,500
District 7-C	239,270	204,996	−14	9,028
District 8	3,402,358	3,205,538	− 6	1,016,630
District 8-A	2,793,503	2,785,308	− 0.3	686,861
District 9	324,018	363,708	+12	10,555
District 10	177,275	170,359	− 4	3,500
Utah	244,397	264,512	+ 8	44,100
West Virginia	34,040	32,126	− 6	5,000
Wyoming	949,779	916,763	− 3	131,644
Miscellaneous‡	6,526	7,556	+16	....
Total U.S.	36,339,408	35,299,839	− 2.9	5,144,360
Gulf of Mexico§	2,565,862	2,347,525	− 8.5	40,532

---

* Includes offshore reserves.

† Additional reserves include additional recoveries in known reservoirs (in excess of the proved reserves) which engineering knowledge and judgment indicate will be economically available by application of fluid injection, whether or not such program is currently installed.

‡ Includes Arizona, Missouri, Nevada, S. Dakota, Tennessee and Virginia.

§ Included with Texas and Louisiana.

(Source 6)

U.S. PROVED RESERVES OF LIQUID HYDROCARBONS, AS OF DECEMBER 31

(THOUSANDS OF 42 GALLON BARRELS)

	NEW OIL ADDED DURING YEAR								
Year	Revisions	Extensions	New Field Discoveries	New Reservoir Discoveries in Old Fields	Total	Production[1]	Proved Reserves at End of Year	Net Change From Previous Year	Indicated Additional Reserves from Known Reservoirs
				CRUDE OIL					
1964	899,292	1,419,182	126,682	219,611	2,664,767	2,644,247	30,990,510	20,520	
1965	1,783,231	792,901	237,335	234,612	3,048,079	2,686,198	31,352,391	361,881	
1966	1,839,307	814,249	160,384	150,038	2,963,978	2,864,242	31,452,127	99,736	7,594,019[a]
1967	1,900,969	716,467	125,105	219,581	2,962,122	3,037,579	31,376,670	(75,457)	7,622,413
1968	1,320,109	776,780	166,291	191,455	2,454,635	3,124,188	30,707,117	(669,553)	7,040,558
1969	1,258,142	614,710	96,435	150,749	2,120,036	3,195,291	29,631,862	(1,075,255)	6,607,898
1970	2,088,927	631,354	9,852,512	116,125	12,688,918	3,319,445	39,001,335	9,369,473	5,352,636
1971	1,600,426	560,596	91,469	65,241	2,317,732	3,256,110	38,062,957	(938,378)	4,948,516
1972	820,107	459,311	123,210	155,220	1,557,848	3,281,397	36,339,408	(1,723,549)	5,190,257
1973	1,551,777	390,141	116,097	87,816	2,145,831	3,185,400	35,299,839	(1,039,569)	5,144,360
				NATURAL GAS LIQUIDS					
1964	457,702		151,042		608,744	536,090	7,746,632	72,654	
1965[b]	721,605		110,707		832,312	555,410	8,023,534	276,902	
1966	634,233	131,583	53,378	74,922	894,116	588,684	8,328,966	305,432	
1967	671,112	159,725	57,272	41,649	929,758	644,493	8,614,231	285,265	
1968	469,689	155,940	26,642	33,388	685,659	701,782	8,598,108	(16,123)	
1969	106,192	106,815	26,831	41,190	281,028	735,962	8,143,174	(454,934)	
1970	35,446	103,740	34,234	134,159	307,579	747,812	7,702,941	(440,233)	
1971	135,144	93,909	28,513	90,154	347,720	746,434	7,304,227	(398,714)	
1972	38,796	112,537	32,652	54,288	238,273	755,941	6,786,559	(517,668)	
1973	231,460	121,835	19,202	36,482	408,979	740,831	6,454,707	(331,852)	
				TOTAL LIQUID HYDROCARBONS					
1964	2,776,176		497,335		3,273,511	3,180,337	38,737,142	93,174	
1965[b]	3,297,737		582,654		3,880,391	3,241,608	39,375,925	638,783	
1966	2,473,540	945,832	213,762	224,960	3,858,094	3,452,926	39,781,093	405,168	7,594,019[a]
1967	2,572,081	876,192	182,377	261,230	3,891,880	3,682,072	39,990,901	209,808	7,622,413
1968	1,789,798	932,720	192,933	224,843	3,140,294	3,825,970	39,305,225	(685,676)	7,040,558
1969	1,364,334	721,525	123,266	191,939	2,401,064	3,931,253	37,775,036	(1,530,189)	6,607,898
1970	2,124,373	735,094	9,886,746	250,284	12,996,497	4,067,257	46,704,276	8,929,240	5,352,636
1971	1,735,570	654,505	119,982	155,395	2,665,452	4,002,544	45,367,184	(1,337,092)	4,948,516
1972	858,903	571,848	155,862	209,508	1,796,121	4,037,338	43,125,967	(2,241,217)	5,190,257
1973	1,783,237	511,976	135,299	124,298	2,554,810	3,926,231	41,754,546	(1,371,421)	5,144,360

[a] Additional reserves in 1966 include: (1) 220,272,000 barrels anticipated from "behind-the-pipe" reservoirs where evidence of reserves is indicated by wire line tests (rather than proven by actual production or drill stem tests), and (2) additional recoveries of 7,373,747,000 barrels in known reservoirs (in excess of the proved reserves) which engineering knowledge and judgment indicate will be economically available by application of fluid injection, whether or not such program is currently installed. For all subsequent years, additional reserves are only those classified as (2) above.

[b] Separation of revisions from extensions and of new field discoveries from new pool discoveries not available for "Natural Gas Liquids" and "Total Liquid Hydrocarbons" prior to 1966.

[1] Production is the amount originally estimated and used by A.P.I. and A.G.A. in prior volumes of the reserves report. These figures differ from actual production as reported by A.P.I. and the U.S. Bureau of Mines appearing elsewhere in this volume.

( ) Denotes negative volume

Source: American Petroleum Institute, American Gas Association, *Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada and United States Productive Capacity.*

(Source 9)

ESTIMATED PROVED RECOVERABLE RESERVES OF LIQUID HYDROCARBONS IN THE UNITED STATES, 1950-1973

(Thousands of barrels)

Year	New Oil Added During Year			Production during Year	Estimated Proved Reserves as of End of Year	Net Change over Previous Year
	Through Revisions of Previous Estimates and Extensions to Known Fields	Through New Pools Discovered during Year	Total through New Discoveries, Extensions, and Revisions			
1950	2,705,648	623,099	3,328,747	2,171,187	29,536,061	1,157,560
1951	4,673,195	464,750	5,137,945	2,481,373	32,192,633	2,656,572
1952	2,728,030	578,096	3,306,126	2,541,554	32,957,205	764,572
1953	3,352,497	687,602	4,040,099	2,614,554	34,382,750	1,425,545
1954	2,308,061	672,326	2,980,387	2,557,934	34,805,203	422,453
1955	2,840,927	544,305	3,385,232	2,739,700	35,450,735	645,532
1956	3,222,878	561,278	3,784,156	2,897,910	36,336,981	886,246
1957	2,017,487	544,705	2,562,192	2,911,408	35,987,765	(349,216)
1958	3,043,469	422,979	3,466,448	2,714,278	36,739,935	752,170
1959	3,891,288	478,901	4,370,189	2,868,469	38,241,655	1,501,720
1960	2,715,093	375,365	3,090,458	2,902,843	38,429,270	187,615
1961	2,886,730	465,523	3,352,253	2,973,922	38,807,601	378,331
1962	2,380,880	532,565	2,913,445	3,020,306	38,700,740	(106,861)
1963	2,524,402	527,828	3,052,230	3,109,002	38,643,968	(56,772)
1964	2,776,176	497,335	3,273,511	3,180,337	38,737,142	93,174
1965	3,297,737	582,654	3,880,391	3,241,608	39,375,925	638,783
1966	3,419,372	438,722	3,858,094	3,452,926	39,781,093	405,168
1967	3,448,273	443,607	3,891,880	3,682,072	39,990,901	209,808
1968	2,722,518	417,776	3,140,294	3,825,970	39,305,225	(685,676)
1969	2,085,859	315,205	2,401,064	3,931,253	37,775,036	(1,530,189)
1970	2,859,467	10,137,030	12,996,497	4,067,257	46,704,276	8,929,240
1971	2,390,075	275,377	2,665,452	4,002,544	45,367,184	(1,337,092)
1972	1,430,751	365,370	1,796,121	4,037,338	43,125,967	(2,241,217)
1973	2,295,213	259,597	2,554,810	3,926,231	41,754,546	(1,371,421)

( ): Denotes negative volume.

Source: A.G.A., American Petroleum Institute and Canadian Petroleum Association. *Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the U.S.A. and Canada,* 1973.

(Source 9)

CHANGES IN ESTIMATED PROVED RECOVERABLE RESERVES OF CRUDE OIL, BY STATE, DURING 1973

(Thousands of barrels)

State	Reserves as of December 31, 1972	Changes in Reserves during 1973					Reserves as of December 31, 1973
		Revisions	Extensions	New Fields Discovered	New Pools Discovered	Estimated Production	
United States	36,339,040	1,551,777	398,141	116,097	87,816	3,185,400	35,299,839
Alabama	56,734	653	5,000	1,776	–	10,900	53,603
Alaska	10,096,282	85,754	–	1,500	1,000	72,323	10,112,213
Arkansas	113,160	5,098	3,500	60	75	17,121	105,552
California^a	3,553,735	217,564	16,740	30,000	5,860	335,701	3,488,160
San Joaquin	1,738,365	89,408	2,690	30,000	280	126,765	1,733,940
Coastal	513,323	80,124	14,050	–	5,580	76,762	536,380
Los Angeles	1,302,046	48,034	–	–	–	132,214	1,197,866
Colorado	326,411	4,474	7,176	3,096	99	36,864	304,790
Florida	208,149	2,449	5,097	100	–	32,996	182,859
Illinois	174,080	3,697	1,375	1,297	320	29,107	152,343
Indiana	29,383	1,204	635	392	516	5,398	26,622
Kansas	413,390	6,356	8,566	2,450	5	60,588	401,089
Kentucky	48,193	(6)	325	18	275	8,822	39,980
Louisiana^a	5,028,478	63,306	118,853	31,900	84,112	710,723	4,576,026
North	281,451	6,377	620	103	–	36,663	252,388
South	4,747,027	56,929	118,233	31,797	84,112	683,060	4,324,438
Michigan	63,007	7,129	10,000	7,055	–	13,722	72,444
Mississippi	312,488	30,035	2,335	2,422	410	52,511	291,089
Montana	261,348	11,031	650	930	–	34,516	239,443
Nebraska	30,553	3,830	1,000	61	–	7,306	28,144
New Mexico	582,593	152,852	2,607	333	784	96,214	642,955
Northwest	24,246	4,716	–	38	–	5,138	23,860
Southeast	558,347	148,136	2,607	285	784	91,076	619,134
New York	9,246	–	–	–	–	958	8,288
North Dakota	166,033	24,784	8,470	5	–	19,762	179,530
Ohio	127,388	–	6,378	–	46	8,793	124,911
Oklahoma	1,303,084	130,784	15,500	1,251	–	179,579	1,270,964
Pennsylvania	37,305	5,530	–	–	–	3,283	39,613
Texas^a	12,144,057	733,449	108,683	17,833	32,086	1,280,300	11,756,613
District 1	167,334	13,876	3,966	353	100	28,370	160,188
District 2	636,768	108,159	1,519	763	4,226	74,210	677,125
District 3	1,536,436	106,304	13,777	1,097	2,870	169,864	1,489,420
District 4	363,753	(2,839)	6,073	95	8,031	51,500	324,422
District 5	98,963	47,780	–	300	3	20,583	126,463
District 6	2,308,438	175	3,550	230	181	163,200	2,049,248
District 7-B	235,962	18,490	13,734	3,513	720	35,499	235,870
District 7-C	239,270	(32,031)	16,317	5,017	161	33,768	204,966
District 8	3,402,356	67,514	30,060	960	1,409	270,783	3,201,536
District 8-A	2,793,503	323,173	9,579	2,054	2,886	345,887	2,785,308
District 9	334,018	72,628	9,333	2,655	1,088	45,971	363,700
District 10	177,275	12,350	700	258	248	20,549	170,259
Utah	344,397	5,096	47,000	60	65	32,104	364,512
West Virginia	34,040	–	530	–	35	2,459	32,136
Wyoming	949,779	68,661	22,501	13,646	1,404	138,308	916,763
Miscellaneous^b	6,526	1,860	165	635	100	1,420	7,586

a. Includes offshore reserves.

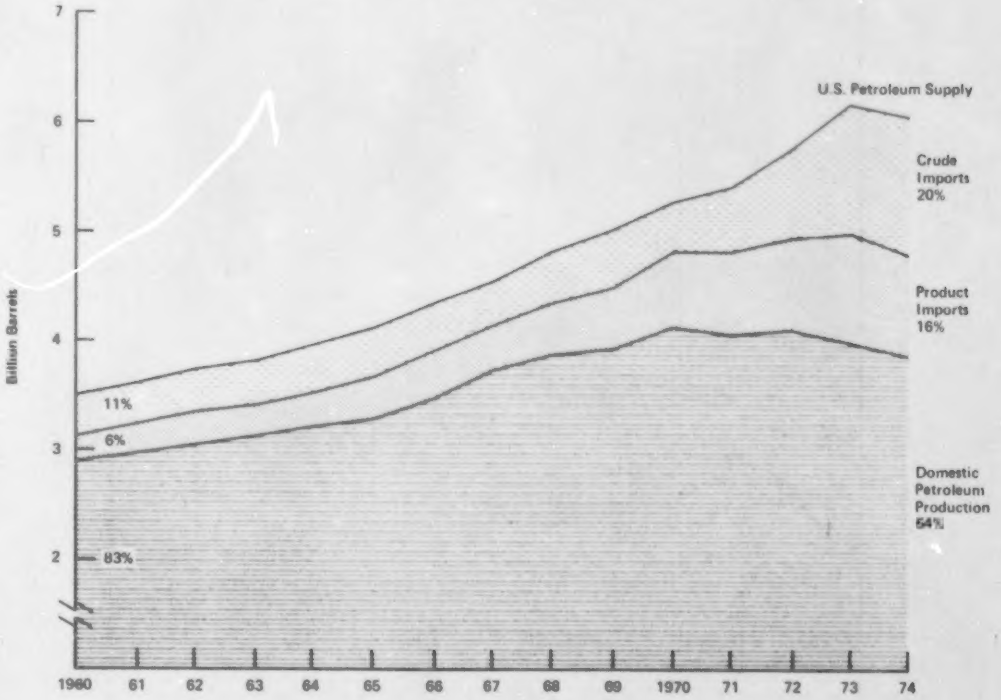
b. Includes Arizona, Missouri, Nevada, South Dakota, Tennessee and Virginia.

( ) Denotes negative volume.

Source: A.G.A., American Petroleum Institute and Canadian Petroleum Association. *Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the U.S.A. and Canada, 1973.*

(Source 17)

U.S. Petroleum Supply, 1960-74



UNITED STATES PRODUCTION, CONSUMPTION, AND SUPPLY

(Source 28)

Production of crude petroleum (including lease condensate)[1] in the United States, by P.A.D. Districts and States, by month, 1973 and year, 1972

(Thousands of barrels)

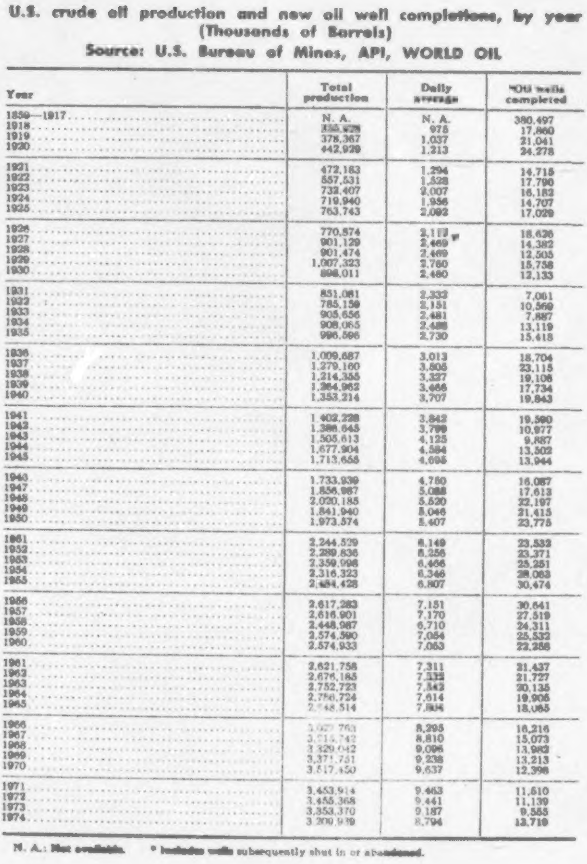
P.A.D. District and State	1973													1972 Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
P.A.D. District:														
I	3,156	3,141	3,462	3,229	3,362	3,193	3,261	3,333	3,292	3,302	3,320	3,336	39,329	26,033
II	29,796	30,048	29,713	29,076	30,997	29,297	29,932	29,471	29,179	29,865	27,960	28,566	353,520	346,237
III	197,467	179,520	200,098	192,813	197,238	193,745	197,086	195,976	185,001	195,964	185,917	193,136	2,312,376	2,311,590
IV	19,363	17,967	19,910	19,862	20,791	20,410	20,753	20,531	21,093	22,176	21,540	21,570	245,750	232,500
V	34,500	32,070	34,189	33,779	34,226	33,317	34,729	34,236	33,376	34,649	33,196	34,376	409,262	421,082
State:														
Alabama	836	871	1,061	1,026	1,087	978	1,039	956	976	978	969	1,083	11,677	9,736
Alaska[2]	6,033	6,061	5,998	5,901	6,175	5,937	6,240	6,405	6,015	6,213	5,944	6,062	73,323	72,893
Arizona	76	74	76	72	65	69	62	68	63	58	58	63	806	993
Arkansas	1,547	1,407	1,562	1,508	1,510	1,462	1,517	1,547	1,537	1,571	1,539	1,469	18,016	18,519
California, total[2]	25,692	26,072	28,249	27,517	28,098	27,301	28,461	28,434	27,276	28,148	27,126	28,241	336,075	347,022
South	11,510	10,445	11,365	11,043	11,790	10,880	11,142	11,095	10,659	10,969	10,830	10,924	132,192	141,883
Central Coastal	6,609	6,031	6,700	6,471	6,720	6,614	6,783	6,768	6,423	6,685	6,410	6,537	78,720	77,333
East Central	10,494	9,494	10,318	10,743	10,626	10,253	10,482	10,512	10,147	10,657	10,297	10,722	124,458	127,139
North	64	57	64	60	62	56	54	59	57	57	59	58	705	667
Colorado	2,883	2,715	2,921	2,898	3,027	3,000	3,107	2,866	3,158	3,295	3,232	3,170	36,590	37,015
Florida	2,503	2,627	2,910	2,713	2,770	2,519	2,698	2,787	2,719	2,769	2,758	2,796	32,695	36,097
Illinois	2,779	2,616	2,780	2,616	2,747	2,506	2,511	2,601	2,493	2,576	2,442	2,306	30,973	34,976
Indiana	456	424	468	435	460	422	467	441	417	462	444	416	5,312	6,139
Kansas	5,677	5,416	5,605	5,669	5,925	5,620	5,557	5,672	5,212	5,664	5,269	4,933	66,227	73,766
Kentucky	713	607	706	765	706	709	736	750	679	766	639	655	8,387	9,709
Louisiana, total[3]	77,089	66,569	72,620	69,926	70,251	68,776	71,616	70,323	71,757	69,970	67,095	68,171	831,464	891,827
Gulf Coast	64,917	62,417	69,210	66,836	67,940	65,705	68,297	66,774	68,453	66,215	63,625	64,640	791,760	847,554
Rest of State	3,566	3,223	3,409	3,090	3,013	3,049	3,327	3,444	3,304	3,465	3,451	3,523	39,704	44,273
Michigan	1,371	1,069	1,020	1,219	1,222	1,202	1,253	1,257	1,206	1,310	1,245	1,350	14,614	12,990
Mississippi	5,096	4,316	4,648	4,633	4,751	4,571	4,760	4,707	4,606	4,609	4,520	4,611	56,192	61,100
Missouri	5	5	5	5	5	5	5	5	5	5	5	5	60	60
Montana	2,866	2,501	2,963	2,907	2,997	2,863	2,887	2,961	2,868	3,035	2,911	3,001	34,620	33,900
Nebraska	653	591	644	579	630	614	622	623	579	600	575	562	7,240	8,705
Nevada	9	8	8	8	8	5	8	7	7	9	8	8	96	100
New Mexico, total	8,686	7,483	8,753	8,421	8,606	8,292	8,341	8,326	8,077	8,325	8,333	8,447	100,986	119,592
Southeastern	8,043	7,917	8,148	7,776	8,052	7,676	7,719	7,716	7,458	7,537	7,574	7,761	93,416	101,390
Northwestern	643	562	597	625	646	616	622	610	625	628	652	686	7,570	8,605
New York	72	76	76	84	90	84	86	84	92	96	81	80	987	1,016
North Dakota	1,783	1,640	1,686	1,675	1,754	1,638	1,687	1,701	1,690	1,726	1,524	1,662	20,215	20,624
Ohio	657	584	895	779	820	793	750	792	716	752	774	795	8,796	9,358
Oklahoma	17,117	17,071	16,090	15,292	16,179	15,768	16,217	15,574	16,228	15,955	14,985	15,756	191,204	207,633
Pennsylvania	298	265	252	238	246	280	283	291	262	306	272	248	3,252	3,441
South Dakota	18	17	17	17	19	19	19	29	28	30	34	31	275	219
Tennessee	17	14	17	15	17	16	19	19	16	17	15	17	201	198
Texas, total[2]	100,126	99,671	111,149	107,321	110,201	107,669	109,707	109,949	106,175	110,177	106,519	109,533	1,294,671	1,301,685
District 01	1,793	1,621	1,891	1,705	1,815	1,712	1,763	1,758	1,676	1,720	1,661	1,714	21,147	24,805
District 02	6,517	5,976	6,665	6,511	6,514	6,171	6,598	6,580	6,352	6,501	6,211	6,391	77,467	81,505
District 03	14,996	13,611	15,135	14,791	15,009	14,333	14,565	14,894	14,342	14,826	14,204	14,726	175,557	179,708
District 04	5,129	4,765	5,413	5,073	5,297	5,096	5,120	5,019	4,754	4,999	4,631	4,584	60,071	68,113
District 05	2,587	2,504	2,760	2,675	2,772	2,710	2,791	2,813	2,668	2,794	2,698	2,751	32,763	33,357
District 06, except East Texas	6,757	6,087	6,962	6,679	6,764	6,503	6,527	6,751	6,594	6,736	6,485	6,720	79,775	85,082
East Texas	6,366	5,812	6,512	6,273	6,461	6,260	6,362	6,335	6,117	6,234	6,107	6,297	75,439	77,136
District 07B	3,051	2,775	3,160	3,070	3,116	2,979	3,010	3,085	2,925	3,037	2,962	3,024	36,232	37,995
District 07C	3,400	3,194	3,538	3,355	3,387	3,243	3,333	3,302	3,208	3,343	3,301	3,252	39,856	42,080
District 08	23,421	21,096	24,177	23,330	23,989	22,964	23,697	23,560	22,661	23,955	23,132	23,708	279,851	280,676
District 08A	27,779	25,579	28,716	27,896	29,108	27,955	29,032	29,020	29,130	30,581	28,115	28,758	341,301	312,720
District 09	3,919	3,663	4,035	3,921	3,962	3,516	3,568	3,633	3,600	3,505	3,449	3,608	43,650	39,711
District 10	1,632	1,550	1,864	1,818	1,907	1,859	1,873	1,847	1,775	1,864	1,779	1,821	22,271	24,685
Utah	2,340	2,320	2,560	2,618	2,723	2,705	2,777	2,581	2,732	3,116	2,314	1,090	32,636	28,570
West Virginia	221	193	217	193	207	190	180	179	164	223	166	208	2,339	2,677
Wyoming	11,656	10,531	11,778	11,327	12,055	11,751	11,582	11,951	12,305	12,178	12,177	12,294	141,915	140,311
United States, total	284,458	254,000	287,490	278,717	288,136	279,411	285,711	284,297	271,939	285,568	271,527	280,960	3,360,903	3,455,368
Daily Average	9,176	9,071	9,274	9,291	9,294	9,314	9,217	9,171	9,065	9,212	9,051	9,063	9,208	9,441
Pa. Grade (incl. in U.S. total)	951	912	964	1,098	1,023	1,024	1,024	1,025	970	1,128	1,016	1,027	12,292	11,126

[1] See Table 7 for production of lease condensate.

[2] Includes offshore production. See Table 9 for detail.

[3] Includes Zones 2, 3, and 4 offshore production 301,607 (including 297,952 undisputed crude oil).

(Source 16)



U.S. crude oil production and new oil well completions, by year
(Thousands of Barrels)
Source: U.S. Bureau of Mines, API, WORLD OIL

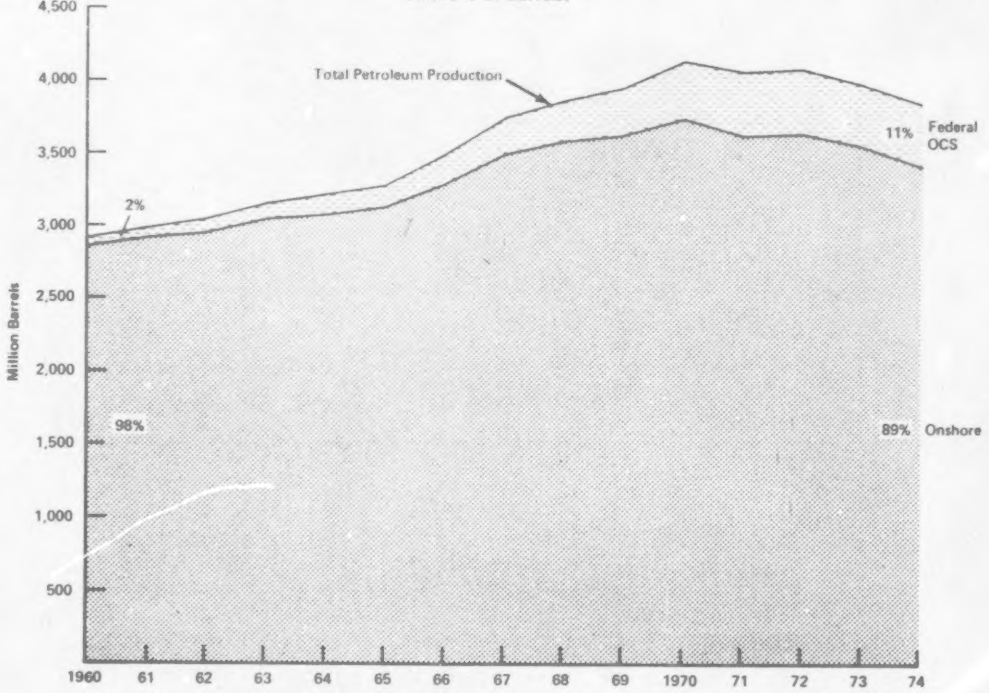
Year	Total production	Daily average	*Oil wells completed
1859—1917	N. A.	N. A.	380,497
1918	355,928	975	17,860
1919	378,367	1,037	21,041
1920	442,929	1,213	24,278
1921	472,183	1,294	14,715
1922	557,531	1,528	17,790
1923	732,407	2,007	16,182
1924	719,940	1,956	14,707
1925	763,743	2,092	17,029
1926	770,874	2,112	18,626
1927	901,129	2,469	14,382
1928	901,474	2,469	12,505
1929	1,007,323	2,760	15,758
1930	898,011	2,460	12,133
1931	851,081	2,332	7,061
1932	785,159	2,151	10,569
1933	905,656	2,481	7,887
1934	908,065	2,486	13,119
1935	996,596	2,730	15,418
1936	1,009,687	3,013	18,704
1937	1,279,160	3,505	23,115
1938	1,214,355	3,327	19,108
1939	1,264,962	3,466	17,734
1940	1,353,214	3,707	19,843
1941	1,402,228	3,842	19,590
1942	1,386,645	3,799	10,977
1943	1,505,613	4,125	9,887
1944	1,677,904	4,584	13,502
1945	1,713,655	4,695	13,944
1946	1,733,939	4,750	16,087
1947	1,856,987	5,088	17,613
1948	2,020,185	5,520	22,197
1949	1,841,940	5,046	21,415
1950	1,973,574	5,407	23,775
1951	2,244,529	6,149	23,532
1952	2,289,836	6,256	23,371
1953	2,359,998	6,466	25,251
1954	2,316,323	6,346	28,063
1955	2,484,428	6,807	30,474
1956	2,617,283	7,151	30,641
1957	2,616,901	7,170	27,519
1958	2,448,987	6,710	24,311
1959	2,574,590	7,054	25,532
1960	2,574,933	7,053	22,258
1961	2,621,758	7,311	21,437
1962	2,676,185	7,332	21,727
1963	2,752,723	7,542	20,135
1964	2,786,724	7,614	19,908
1965	2,848,514	7,804	18,065
1966	3,027,763	8,295	16,216
1967	3,215,742	8,810	15,073
1968	3,329,042	9,096	13,982
1969	3,371,751	9,238	13,213
1970	3,517,450	9,637	12,398
1971	3,453,914	9,463	11,610
1972	3,455,368	9,441	11,139
1973	3,353,370	9,187	9,555
1974	3,200,939	8,794	13,719

N. A.: Not available. * Includes wells subsequently shut in or abandoned.

(Source 17)

U.S. Petroleum Production, 1960-74

(Millions of Barrels)



(Source 16)

U.S. crude oil production, by states and districts
(Sources: U.S. Bureau of Mines, API)

State of district	Barrels daily (in thousands) 1974	Barrels daily (in thousands) 1973*	Barrels annually (in thousands) 1974	Barrels annually (in thousands) 1973*	% diff.
Alabama	34.9	33.3	12,748	12,155	+ 4.9
Alaska	193.8	198.4	70,740	72,412	− 2.3
Arizona	2.0	2.2	743	800	− 7.1
Arkansas	45.6	49.4	16,624	18,044	− 7.9
California	882.8	920.7	322,236	336,066	− 4.1
Colorado	102.1	99.7	37,257	36,406	+ 2.3
Florida	99.3	89.6	36,237	32,694	+10.8
Illinois	76.8	81.9	28,012	29,888	− 6.3
Indiana	13.2	14.2	4,809	5,165	− 6.9
Kansas	173.1	181.4	63,191	66,227	− 4.6
Kentucky	22.2	23.8	8,101	8,684	− 6.7
Louisiana	2,036.3	2,255.8	743,248	823,372	− 9.7
North Louisiana	109.3	110.3	39,883	40,243	− 0.9
South Louisiana	1,927.0	2,145.6	703,365	783,129	−10.2
Michigan	47.4	40.0	17,309	14,606	+18.5
Mississippi	140.1	153.7	51,132	56,082	− 3.7
Missouri	0.2	0.2	68	67	+ 1.5
Montana	94.6	94.4	34,516	34,444	+ 0.2
Nebraska	18.5	19.8	6,735	7,231	− 6.9
Nevada	0.5	0.3	177	98	+80.6
New Mexico	265.5	275.7	96,923	100,641	− 3.7
Southeast New Mexico	241.8	255.1	88,243	93,103	− 5.2
Northwest New Mexico	23.8	20.7	8,680	7,538	+15.1
New York	2.9	2.5	1,047	908	+15.3
North Dakota	53.5	54.5	19,533	19,898	− 1.8
Ohio	25.7	23.7	9,383	8,639	+ 8.6
Oklahoma	484.2	523.8	176,724	191,197	− 7.6
Pennsylvania	10.8	10.6	3,924	3,868	+ 1.4
South Dakota	1.2	0.8	428	275	+55.6
Tennessee	0.5	0.5	195	198	− 1.5
Texas	3,461.0	3,546.3	1,263,251	1,294,386	− 2.4
Districts—					
1: South Central	52.6	58.3	19,214	21,263	− 9.6
2: Middle Gulf	196.9	211.8	71,874	77,306	− 7.0
3: Upper Gulf	480.0	484.0	175,203	176,667	− 0.8
4: Lower Gulf	144.4	164.7	52,704	60,123	−12.3
5: East Central	57.5	59.8	20,975	21,821	− 3.9
6: Northeast	431.7	453.1	157,576	165,378	− 4.7
7-B: North Central	100.2	99.6	36,579	36,350	+ 0.6
7-C: West Central	86.3	97.3	31,491	35,517	−11.5
8: West	1,736.7	1,731.6	633,911	632,032	+ 0.3
9: North	116.0	125.4	42,334	45,782	− 7.5
10: Panhandle	58.6	60.7	21,390	22,147	− 3.4
Utah	108.0	87.4	39,400	31,894	+23.5
Virginia	......	......	......	......	......
West Virginia	7.1	6.5	2,597	2,385	+ 8.9
Wyoming	390.8	396.3	142,651	144,640	− 1.4
Total United States	8,794.5	9,187.4	3,209,939	3,353,370	− 4.3

* Revised.

(Source 16)

U.S. wells producing crude oil at end of 1974, by states

State or district	Crude oil wells: Flowing	Crude oil wells: Artificial lift	Crude oil wells: Total wells	Bbls. daily production: Total (In thousands)	Bbls. daily production: Per well
Alabama	35	384	419	34.9	83.3
Alaska	42	186	228	193.8	850.0
Arizona	0	28	28	2.0	72.7
Arkansas	123	6,993	7,116	45.5	6.4
California	453	39,777	40,230	882.8	21.9
Colorado	119	1,921	2,040	102.1	50.0
Florida	63	70	133	99.3	747.0
Illinois	0	23,718	23,718	76.8	3.2
Indiana	0	4,376	4,376	13.2	3.0
Kansas	275	41,480	41,755	173.1	4.1
Kentucky	0	14,129	14,129	22.2	1.6
Louisiana	6,545	21,428	27,973	2,036.3	72.8
North Louisiana	261	14,854	15,115	109.3	7.2
South Louisiana	3,044	6,214	9,258	1,927.0*	149.9*
Offshore Louisiana	3,240	360	3,600		
Michigan	682	3,132	3,814	47.4	12.4
Mississippi	180	2,074	2,254	140.1	62.2
Missouri	0	137	137	0.2	1.5
Montana	7	3,021	3,028	94.6	31.2
Nebraska	0	1,109	1,109	18.5	16.7
New Mexico	2,143	11,139	13,282	265.5	19.9
Southeast New Mexico	1,981	10,273	12,254	241.7	19.7
Northwest New Mexico	152	876	1,028	23.8	23.2
New York	0	5,475	5,475	2.9	0.5

State or district	Crude oil wells: Flowing	Crude oil wells: Artificial lift	Crude oil wells: Total wells	Bbls. daily production: Total (In thousands)	Bbls. daily production: Per well
North Dakota	243	1,245	1,488	53.5	36.0
Ohio	302	14,847	15,149	25.7	1.7
Oklahoma	3,879	67,969	71,848	484.2	6.7
Pennsylvania	75	30,825	30,900	10.8	0.3
Tennessee	31	56	87	0.5	5.7
Texas	20,063	140,011	160,074	3,461.0	21.6
Districts—					
1 S. Central	814	9,728	10,542	52.6	5.0
2 Middle Gulf	1,439	3,071	4,510	196.1	43.5
3 Upper Gulf	1,895	7,752	9,647	480.0	49.8
4 Lower Gulf-S.W.	2,053	5,099	7,152	144.4	20.2
5 E. Central	154	2,359	2,513	57.5	22.9
6 Northeast	6,878	11,495	18,373	431.7	23.5
7-B N. Central	681	9,670	10,351	100.2	9.7
7-C W. Central	907	6,553	7,460	86.3	11.6
8 West	3,579	49,584	53,163	1,736.7	32.7
9 North	1,217	23,467	24,684	116.0	4.7
10 Panhandle	446	11,231	11,677	58.6	5.0
Utah	230	989	1,219	107.9	88.5
West Virginia	0	13,650	13,650	7.1	0.5
Wyoming	606	8,050	8,656	390.8	45.1
Other States	9	28	37	1.7	45.9
Total U.S., 1974	36,105	458,247	494,352	8,794.4	17.8
Total U.S., 1973	35,867	464,101	499,968	9,205.15	18.4

* Includes offshore Louisiana

(Source 28)

Supply, demand and stocks of all oils by PAD Districts
for year 1973
(Thousand barrels daily)

	P.A.D. Districts						
	I	II	III	IV	I-IV	V	U.S.
Domestic Prod.: Crude & lease condensate	108	969	6,336	673	8,086	1,122	9,208
Natural gas plant liquids	24	246	1,386	46	1,702	36	1,738
Receipts from other districts	3,073	2,708	178	57	28	167	
Imports:							
Natural gasoline and plant condensate	5	67	--	28	100	8	108
Crude oil	1,277	714	399	44	2,434	810	3,244
Unfinished oils	72	2	29	--	103	34	137
Refined products	2,392	81	125	17	1/ 2,615	2/ 152	2,767
Other hydrocarbons and hydrogen input	2	1	13	--	16	13	29
Total new supply	6,951	4,788	8,466	865	15,084	2,342	17,231
Unaccounted for crude oil	--	13	-20	8	1	2	3
Processing gain	55	126	184	7	372	81	453
Total supply	7,008	4,927	8,630	880	15,457	2,425	17,687
Change in stocks of all oil	+72	+69	+27	+8	+176	-41	+135
Total disposition of primary supply	6,936	4,858	8,603	872	15,281	2,466	17,552
Exports:							
Crude oil	--	--	1	--	1	1	2
Refined products	17	10	103	--	130	99	229
Shipments to other districts	228	218	5,235	414	167	28	
Crude losses (est. for individual Dist. I-IV)	3	4	4	1	12	1	13
Domestic demand for products:							
Gasoline, total	2,247	2,305	977	208	5,737	982	6,719
Motor gasoline	2,237	2,293	966	206	5,702	972	6,674
Aviation gasoline	10	12	11	2	35	10	45
Jet fuel, total	419	204	99	31	753	306	1,059
Naphtha - type	63	35	46	8	152	65	217
Kerosine - type	356	169	53	23	601	241	842
Ethane (including ethylene)	5	38	283	--	326	1	327
Liquefied gases	180	344	512	29	1,065	57	1,122
Kerosine	90	64	53	5	212	4	216
Distillate fuel oil	1,441	897	348	95	2,781	311	3,092
Residual fuel oil	1,960	219	187	26	2,392	430	2,822
Petrochemical feedstocks	26	38	273	1	338	19	357
Special naphthas	21	26	28	--	75	14	89
Lubricants	66	39	40	--	145	17	162
Wax	7	3	6	--	16	3	19
Coke	30	99	87	11	227	34	261
Asphalt	161	176	91	34	442	58	500
Road oil	2	12	--	2	16	6	22
Still gas for fuel	62	127	192	15	396	88	484
Plant condensate	--	5	--	--	5	--	5
Miscellaneous products	11	10	24	--	45	7	52
Total	6,688	4,626	3,200	457	14,971	2,337	17,308
Stocks of all oils (thousand barrels)							
Crude oil and lease condensate	18,118	67,625	108,705	13,231	207,479	34,999	242,478
Unfinished oils	15,712	20,126	36,709	2,795	75,342	23,812	99,154
Natural gasoline and plant condensate	16	7,278	5,061	392	7,745	90	7,835
Refined products	195,946	194,658	184,676	17,805	593,085	65,755	658,840
Total	229,792	289,687	335,151	34,223	883,651	124,656	1,008,307

(Source 6)

TOTAL U.S. SUPPLY AND DEMAND – CRUDE OIL AND LEASE CONDENSATE

(DAILY AVERAGES IN THOUSANDS OF 42 GALLON BARRELS)

	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Production	7,614	7,804	8,295	8,810	9,095	9,238	9,637	9,462	9,441	9,187
Imports	1,198	1,238	1,225	1,128	1,290	1,409	1,324	1,681	2,216	3,244
New supply	8,812	9,042	9,520	9,938	10,385	10,647	10,961	11,143	11,657	12,431
Change in stocks	–20	–27	+49	+29	+63	–19	+31	–46	–36	–11
Unaccounted for	–	–	–	–	+20	–7	–21	+41	+28	+23
Disposition by use:										
Total	8,832	9,069	9,471	9,909	10,342	10,659	10,909	11,230	11,721	12,465
Exports	3	3	4	73	5	4	14	2	1	2
Domestic use	8,829	9,066	9,467	9,836	10,337	10,655	10,895	11,228	11,720	12,463
Run to stills	8,807	9,043	9,445	9,815	10,312	10,629	10,869	11,199	11,696	12,431
Transfers to F.O.	12	13	12	12	14	14	14	17	11	19
Losses	10	10	10	9	11	12	12	12	13	13

Source: Bureau of Mines, *Petroleum Statement*, Annual and December issues.

TOTAL U.S. SUPPLY AND DEMAND – ALL OILS

(DAILY AVERAGES IN THOUSANDS OF 42 GALLON BARRELS)

	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Production										
Crude oil	7,614	7,804	8,295	8,811	8,660	8,778	9,180	9,032	8,998	8,768
Lease condensate					435	460	457	431	443	419
Nat. gas liquids	1,155	1,210	1,284	1,409	1,504	1,590	1,660	1,693	1,744	1,738
Total	8,769	9,014	9,579	10,220	10,599	10,828	11,297	11,156	11,185	10,925
Imports										
Crude oil	1,198	1,238	1,225	1,128	1,290	1,409	1,324	1,680	2,216	3,244
Refined products	1,060	1,230	1,348	1,409	1,550	1,757	2,095	2,245	2,525	2,958
Total	2,258	2,468	2,573	2,537	2,840	3,166	3,419	3,925	4,741	6,202
Other refinery input	–	–	–	–	9	11	17	17	28	30
New supply	11,027	11,482	12,152	12,757	13,448	14,005	14,733	15,098	15,954	17,157
Unaccounted for crude oil	–	–	–	–	+20	–7	–21	+40	+28	+23
Processing gain	217	220	246	292	319	335	359	382	388	453
Total supply	11,244	11,702	12,398	13,049	13,787	14,333	15,071	15,520	16,370	17,633
Change in stocks	+10	–8	+104	+173	+152	–48	+103	+71	–232	+135
Total disposition of primary supply	11,234	11,710	12,294	12,876	13,635	14,381	14,968	15,449	16,602	17,498
Exports										
Crude oil	3	3	4	73	5	4	14	1	1	2
Refined products	198	184	194	234	226	228	245	223	222	229
Total	201	187	198	307	231	232	259	224	223	231
Crude oil losses	10	10	11	9	11	12	12	12	12	13
Domestic demand for products	11,023	11,513	12,085	12,560	13,393	14,137	14,697	15,213	16,367	17,254

Source: Bureau of Mines, *Petroleum Statement*, Annual and December issues.

(Source 16)

Supply and demand for all oils in the United States in 1974 and a forecast for 1975

(Thousands barrels daily)

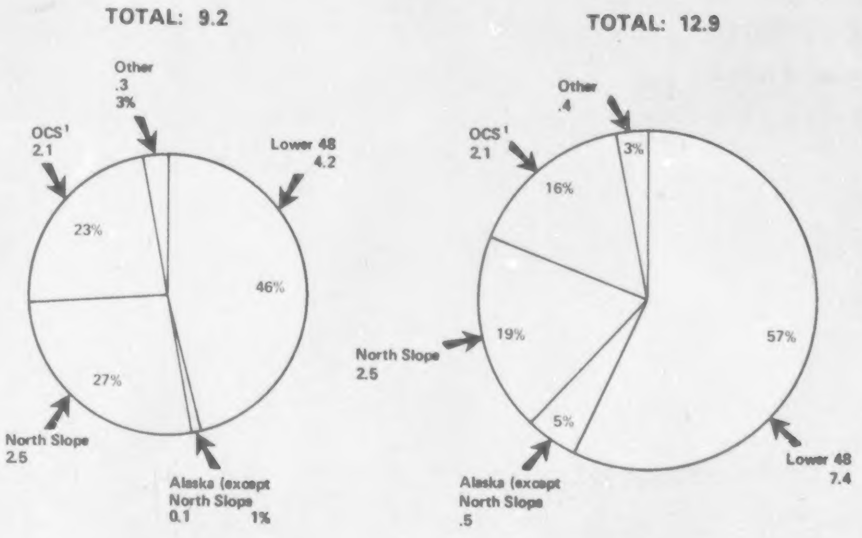
ITEM	1974*	1975	% change
SUPPLY			
Production	**10,529**	**10,265**	**−2.5**
Crude oil	8,794	8,570	−2.5
Natural gas liquids	1,735	1,695	−2.3
Imports	**6,227**	**5,864**	**−5.8**
Crude oil	3,505	3,278	−6.5
Refined products	2,722	2,586	−5.0
Total new supply	**16,756**	**16,129**	**−3.7**
STOCK CHANGE			
All oils	**+381**	......	.....
DEMAND			
Total product and crude oil demand	**16,375**	**16,129**	**−1.5**
Gasoline (Inc. aviation gas)	6,566	6,486	−1.2
Kerosine (Inc. kero. type jet fuel)	950	943	−0.7
Distillate fuel oil	3,090	3,028	−2.0
Residual fuel oil	2,634	2,594	−1.5
Other oils	3,135	3,078	−1.8
Exports	**218**	**218**	.....
Crude oil	2	2	.....
Refined products	216	216	.....
Crude runs to stills	**12,550**	**12,460**	**−0.8**

* Source: U.S. Bureau of Mines; API; Oct.-Dec. demand estimated.

(Source 17)

Projected U.S. Crude Oil Production, 1985

(Millions of Barrels Per Day)



Business as Usual, $7 Oil

Business as Usual, $11 Oil

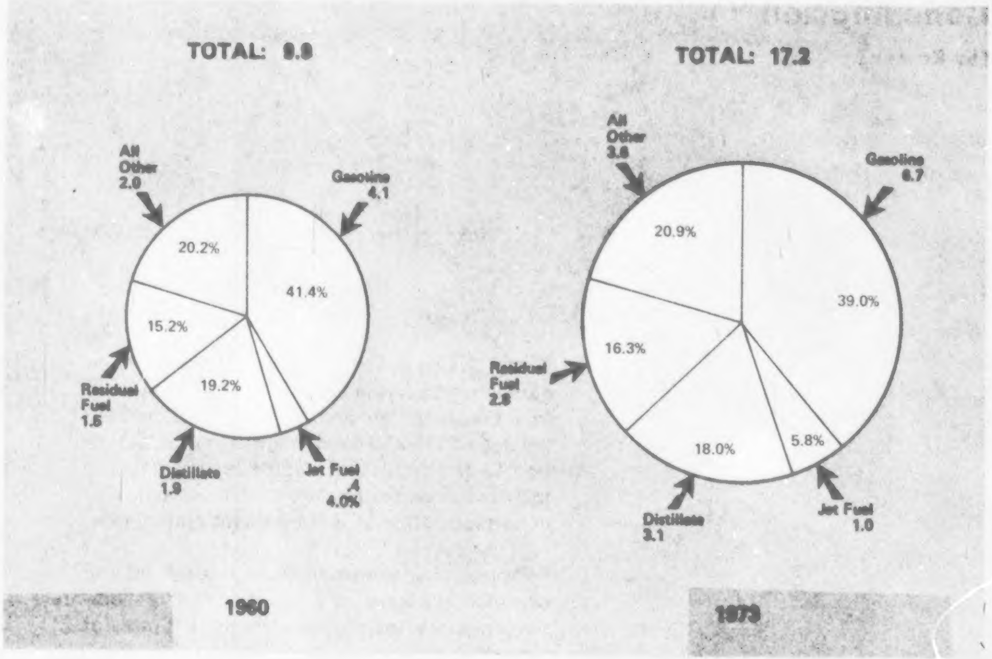
---

[1] OCS = Outer Continental Shelf

(Source 17)

U.S. Petroleum Consumption By Product, 1960 and 1973

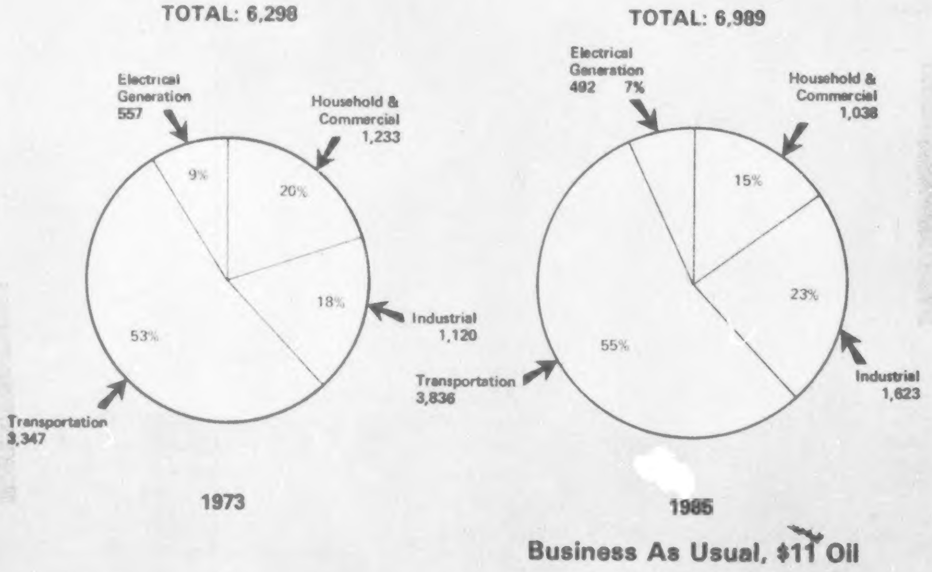
(Millions of Barrels Per Day)



(Source 17)

U.S. Petroleum Consumption, by Sector, 1973 and 1985

(Millions of Barrels)



SHIPPING

(Source 28)

Transportation of petroleum products by pipelines in the United States: by month, 1973 and year, 1972

(Thousands of barrels)

Item	1973													1972 Total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Turned into lines:														
Gasoline, total	136,949	130,902	142,066	142,878	152,482	147,985	160,017	157,408	145,901	149,775	147,060	144,695	1,750,372	1,636,213
Motor	135,011	130,722	141,670	142,561	152,075	147,579	159,770	157,929	145,601	149,385	146,740	144,421	1,755,356	1,632,196
Aviation	238	170	396	317	407	406	247	479	302	390	320	274	4,016	4,017
Jet fuel, total	22,474	20,750	23,029	22,675	19,866	19,082	21,025	18,786	20,316	21,790	21,326	17,852	249,621	225,476
Naphtha-type	1,218	1,211	1,079	1,410	1,407	1,348	1,433	329	1,149	1,120	1,196	1,014	15,112	15,404
Kerosine-type	21,256	19,540	21,950	21,265	18,459	17,734	19,592	18,457	18,567	20,620	20,130	16,838	234,509	210,072
Kerosine	5,908	5,913	4,551	3,200	2,519	1,966	2,757	2,511	3,074	4,764	4,735	4,975	46,583	47,989
Distillate fuel oil	74,102	62,951	62,483	51,338	50,728	50,682	56,046	56,895	57,903	64,249	65,593	70,961	727,019	656,798
Natural gas liquids	35,646	34,541	35,440	34,482	34,070	33,530	37,930	39,382	36,676	36,899	37,002	38,202	438,000	399,176
Delivered from lines:														
Gasoline, total	136,295	129,350	141,942	141,516	152,924	147,321	159,293	160,490	145,804	151,639	148,555	145,448	1,760,550	1,638,796
Motor	136,061	129,154	141,643	141,160	152,613	146,930	158,964	160,029	145,505	151,322	148,165	145,167	1,756,711	1,634,965
Aviation	234	205	299	348	311	391	329	461	299	317	390	275	3,839	3,831
Jet fuel, total	22,410	20,617	22,577	22,455	20,254	19,070	20,557	19,738	19,405	20,843	20,384	18,250	247,035	225,317
Naphtha-type	1,365	1,115	1,574	1,573	1,425	1,450	1,332	1,090	1,092	1,200	1,086	1,033	15,337	15,263
Kerosine-type	21,065	19,502	20,998	20,882	18,829	17,620	19,225	18,648	18,313	19,643	19,298	17,217	231,698	208,054
Kerosine	6,195	5,964	4,551	2,803	2,344	2,000	2,279	2,376	2,927	4,333	4,851	4,867	45,006	46,132
Distillate fuel oil	76,293	63,460	63,485	51,694	51,151	47,870	56,238	54,352	55,097	61,162	66,621	71,616	720,397	657,009
Natural gas liquids	40,793	34,092	35,211	34,600	34,878	32,746	36,027	38,859	34,660	35,427	36,384	37,551	431,225	393,826
Shortage (or overage)[1]														
Gasoline, total	(347)	(67)	(435)	(139)	(485)	258	(253)	(477)	(27)	(377)	(328)	117	(2,475)	(3,812)
Motor	(348)	(81)	(460)	(140)	(437)	241	(256)	(509)	(35)	(396)	(325)	162	(2,583)	(4,198)
Aviation	1	14	25	1	9	27	3	32	8	19	(3)	25	161	171
Jet fuel, total	328	192	83	285	18	227	125	249	111	308	384	309	2,163	1,776
Naphtha-type	(5)	3	26	(20)	(41)	(19)	(28)	26	(70)	(7)	33	2	(100)	(10)
Kerosine-type	333	189	57	305	59	246	163	223	181	315	751	307	2,669	1,786
Kerosine	123	136	282	260	167	46	94	76	105	90	85	98	1,608	1,539
Distillate fuel oil	(259)	(339)	115	154	(255)	369	160	21	28	(202)	(240)	(439)	(547)	(352)
Natural gas liquids	205	204	195	(1)	12	(46)	(7)	126	106	1	(22)	629	1,432	388
Stocks in lines and working tanks at end of month:														
Gasoline, total	44,090	45,690	46,249	47,750	47,736	48,132	49,111	46,508	48,722	47,248	46,090	45,156	45,156	43,989
Motor	43,894	45,543	46,030	47,563	47,462	47,870	48,884	46,293	48,504	46,966	45,875	44,967	44,967	43,796
Aviation	196	147	219	187	274	262	227	213	218	282	215	189	189	193
Jet fuel, total	5,542	5,493	5,897	5,832	5,426	5,211	5,844	5,243	5,243	5,902	6,530	5,823	5,823	5,535
Naphtha-type	539	632	711	568	591	508	637	450	577	504	597	576	576	701
Kerosine-type	5,003	4,861	5,186	5,264	4,835	4,703	5,207	4,793	4,666	5,398	5,933	5,247	5,247	5,105
Kerosine	2,038	1,801	1,519	1,654	1,762	1,712	2,076	1,935	2,377	2,718	2,517	2,637	2,637	2,448
Distillate fuel oil	23,813	21,643	20,506	19,966	19,825	24,271	25,879	27,711	30,589	33,818	33,030	32,414	32,414	25,545
Natural gas liquids	13,843	14,066	14,122	14,305	13,755	14,715	16,625	17,522	19,432	20,903	21,563	21,563	21,563	16,195

[1] Figures in parenthesis denote shortage.

(Source 28)

Interdistrict movements by tanker and barge of crude oil and petroleum products, by month, 1973 and year, 1972

(Thousands of barrels)

Item	1973													1972 Total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Gulf Coast to East Coast, total¹														
Crude oil	[illegible]	5,385	5,944	[illegible]	[illegible]	[illegible]	2,504	3,475	3,590	3,278	4,102	4,155	58,614	106,894
Unfinished oils	[illegible]	618	1,063	[illegible]	1,546	[illegible]	519	1,495	755	1,160	1,577	1,291	14,757	25,203
Gasoline, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17,461	[illegible]	[illegible]
Motor	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15,992	16,597	16,473	15,614	13,566	17,136	[illegible]	[illegible]
Aviation	230	206	247	[illegible]	409	[illegible]	210	363	237	226	185	275	3,216	4,047
Special naphthas	514	498	495	[illegible]	757	[illegible]	621	615	503	685	451	825	7,190	6,830
Kerosine	2,152	3,115	1,755	[illegible]	519	815	939	576	1,941	1,378	717	1,326	15,075	13,982
Distillate fuel oil	14,055	11,153	8,775	5,906	5,737	6,830	5,975	8,066	7,030	7,774	8,119	8,973	96,251	131,009
Residual fuel oil	1,136	2,462	1,275	961	2,130	717	1,012	1,197	1,309	1,106	1,370	2,121	15,960	30,859
Jet fuel, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3,047	[illegible]	3,217	[illegible]	[illegible]	[illegible]	[illegible]
Naphtha-type	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	556	563	251	336	1,046	[illegible]	12,123
Kerosine-type	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,220	2,453	2,469	2,452	2,961	2,887	2,500	[illegible]	[illegible]
Lubricating oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,585	1,977	978	955	997	1,193	12,342	11,464
Wax	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	127	41	56	16	35	32	573	996
Asphalt and road oil	155	[illegible]	19	[illegible]	[illegible]	[illegible]	336	617	541	394	469	276	5,669	7,562
Liquefied gases	311	243	645	352	500	[illegible]	79	-	95	133	53	131	1,104	1,565
Petrochemical feedstocks	231	215	155	56	70	214	282	84	241	308	315	463	3,026	2,731
Other products	291	236	584	291	177	[illegible]	[illegible]	177	116	375	211	121	1,654	1,420
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	514,521
Gulf Coast to PAD District II														
Crude oil	506	825	835	576	538	814	1,070	424	590	950	463	974	10,253	15,442
Unfinished oils	9	9	-	-	-	-	-	-	-	-	136	-	120	85
Gasoline, total	2,816	[illegible]	[illegible]	2,411	2,935	2,567	[illegible]	[illegible]	2,560	[illegible]	[illegible]	3,181	[illegible]	39,646
Motor	2,723	[illegible]	[illegible]	[illegible]	2,857	[illegible]	3,068	2,624	2,513	[illegible]	[illegible]	3,121	[illegible]	39,037
Aviation	101	47	14	58	78	53	29	50	47	51	134	63	[illegible]	609
Special naphthas	227	158	314	137	256	234	997	301	197	290	263	365	3,057	1,014
Kerosine	119	165	96	123	7	64	31	84	22	87	21	144	956	1,643
Distillate fuel oil	554	1,143	587	903	915	1,375	541	578	600	681	534	855	9,424	13,952
Residual fuel oil	800	757	1,012	540	561	947	590	730	567	1,081	1,013	1,127	10,523	7,407
Jet fuel, total	254	[illegible]	106	252	168	180	132	173	159	151	227	154	2,625	4,910
Naphtha-type	-	-	-	-	-	-	-	-	14	-	-	-	14	150
Kerosine-type	214	405	106	252	168	180	132	173	145	151	227	154	2,612	4,810
Lubricating oil	221	298	252	286	199	404	303	513	253	377	257	252	3,698	3,102
Asphalt and road oil	61	44	165	273	276	241	177	538	414	654	330	348	3,721	2,165
Liquefied gases	4	18	-	36	15	101	44	102	15	12	195	112	654	793
Petrochemical feedstocks	88	131	145	190	120	136	175	164	28	173	333	154	1,672	1,906
Other products	131	165	45	24	106	66	77	56	118	41	56	47	993	832
Total	[illegible]	6,714	6,150	5,710	6,359	7,179	6,590	6,540	5,934	7,162	6,041	7,753	80,1[illegible]	95,959
Gulf Coast to West Coast														
Crude oil	-	113	-	-	-	-	-	290	-	-	-	-	372	686
Unfinished oils	-	-	20	-	-	320	44	-	-	291	-	-	675	152
Motor gasoline	2	34	-	-	-	-	-	-	-	-	-	-	36	1,273
Kerosine	-	-	-	-	-	-	-	-	365	272	-	43	667	67
Distillate fuel oil	-	-	-	-	-	186	-	318	403	354	302	315	1,878	98
Residual fuel oil	-	-	-	-	-	-	-	-	-	-	-	801	801	-
Jet fuel, total	-	-	-	-	-	-	-	-	-	-	-	110	110	134
Naphtha-type	-	-	-	-	-	-	-	-	-	-	-	691	601	134
Kerosine-type	-	-	-	-	-	-	-	-	-	-	-	194	1,441	-
Lubricating oil	155	73	163	88	39	234	132	125	64	113	88	4	4	1,506
Petrochemical feedstocks	8	-	-	-	-	31	6	-	-	-	-	4	135	52
Other products	8	16	36	-	-	-	-	-	-	-	-	-	-	-
Total	165	236	211	88	39	771	202	732	832	1,037	498	1,266	6,0[illegible]	4,033
West Coast to East Coast														
Special naphthas	-	-	-	-	-	-	2	-	2	-	-	-	4	160
Residual fuel oil	54	21	28	35	64	46	5	113	47	107	111	29	690	693
Lubricating oil	43	-	30	14	42	37	14	17	30	4	-	11	248	82
Other products	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	127	21	58	49	106	83	21	130	79	111	111	40	936	935

¹ Breakdown by region shown in Table 29.

(Source 28)

Tanker and barge movements of crude oil and petroleum products from the Gulf Coast to the East Coast, by region, by months, 1973 and year, 1972

(Thousands of barrels)

Item	1973													1972 Total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
To New England:														
Gasoline, total	4,757	2,272	4,102	[illegible]	[illegible]	[illegible]	2,757	2,815	2,796	[illegible]	[illegible]	2,342	[illegible]	[illegible]
Motor	4,706	2,236	4,017	[illegible]	2,331	2,867	[illegible]	2,754	2,746	2,364	2,461	2,251	33,175	[illegible]
Aviation	51	36	8	14	41	46	[illegible]	14	49	24	45	95	477	[illegible]
Special naphthas	28	17	51	[illegible]	46	[illegible]	75	33	83	55	42	14	567	447
Kerosine	404	119	247	266	333	72	152	190	151	270	174	356	2,924	[illegible]
Distillate fuel oil	6,848	4,720	3,949	2,953	2,432	2,617	1,751	2,577	2,734	2,605	2,728	3,236	35,539	[illegible]
Residual fuel oil	5	1,201	258	14	139	-	296	102	214	475	107	440	4,451	9,135
Jet fuel, total	343	416	733	[illegible]	[illegible]	571	[illegible]	[illegible]	534	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Naphtha-type	64	56	123	254	175	11	171	-	-	-	42	[illegible]	[illegible]	2,740
Kerosine-type	279	360	610	292	740	560	454	737	534	709	423	405	6,038	[illegible]
Lubricating oil	-	31	71	-	48	21	15	28	42	23	4	73	432	[illegible]
Petrochemical feedstocks	24	5	204	5	3	10	-	-	5	10	17	-	310	[illegible]
Other products	11	-	7	[illegible]	8	-	6	8	10	6	12	-	68	[illegible]
Total	[illegible]	9,107	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6,652	[illegible]	[illegible]	[illegible]	112,061
To Central Atlantic:														
Crude oil	7,443	4,948	5,006	6,813	4,593	5,463	2,753	[illegible]	3,557	3,278	4,141	4,103	[illegible]	100,056
Unfinished oils	1,969	818	1,942	1,441	[illegible]	962	859	1,405	734	1,160	1,333	1,251	[illegible]	25,112
Gasoline, total	6,726	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Motor	6,694	[illegible]	[illegible]	[illegible]	4,552	4,503	[illegible]	[illegible]	5,406	5,984	4,174	4,213	[illegible]	[illegible]
Aviation	32	44	13	[illegible]	173	62	90	74	77	135	75	100	913	[illegible]
Special naphthas	238	347	323	[illegible]	400	[illegible]	367	424	427	413	244	444	[illegible]	[illegible]
Kerosine	864	616	831	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	623	804	301	461	[illegible]	[illegible]
Distillate fuel oil	4,814	4,244	2,731	1,405	[illegible]	[illegible]	[illegible]	2,152	1,305	2,736	1,340	2,514	[illegible]	[illegible]
Residual fuel oil	663	[illegible]	256	[illegible]	701	[illegible]	404	[illegible]	330	619	1,046	[illegible]	[illegible]	[illegible]
Jet fuel, total	1,172	1,200	709	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	875	[illegible]	913	910	[illegible]	[illegible]
Naphtha-type	-	75	-	196	290	136	[illegible]	147	162	-	-	154	1,173	[illegible]
Kerosine-type	1,172	1,125	709	446	441	430	[illegible]	[illegible]	713	887	913	756	[illegible]	[illegible]
Lubricating oil	877	712	991	[illegible]	[illegible]	[illegible]	[illegible]	900	761	[illegible]	771	974	10,315	[illegible]
Wax	20	11	13	43	71	[illegible]	75	41	70	16	35	32	[illegible]	[illegible]
Asphalt and road oil	-	-	-	-	115	[illegible]	[illegible]	-	-	27	[illegible]	-	304	[illegible]
Petrochemical feedstocks	147	122	190	157	[illegible]	[illegible]	141	34	196	226	266	392	2,177	1,175
Other products	9	42	[illegible]	[illegible]	110	[illegible]	[illegible]	[illegible]	69	121	161	[illegible]	[illegible]	[illegible]
Total	24,295	[illegible]	[illegible]	[illegible]	15,131	[illegible]	[illegible]	15,900	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
To Lower Atlantic:														
Crude oil	48	137	46	73	131	[illegible]	[illegible]	19	32	-	51	52	[illegible]	[illegible]
Unfinished oils	67	-	-	-	-	-	-	-	[illegible]	-	174	-	242	41
Gasoline, total	9,173	10,870	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8,362	8,203	[illegible]	10,714	[illegible]	[illegible]
Motor	9,036	10,742	9,143	[illegible]	[illegible]	[illegible]	9,791	[illegible]	8,251	8,111	[illegible]	10,654	[illegible]	[illegible]
Aviation	137	128	226	195	[illegible]	141	96	275	111	92	65	59	[illegible]	[illegible]
Special naphthas	268	234	116	157	231	224	152	206	153	197	159	151	[illegible]	[illegible]
Kerosine	584	1,159	747	192	391	454	[illegible]	[illegible]	[illegible]	298	242	531	[illegible]	[illegible]
Distillate fuel oil	2,399	2,183	2,098	2,113	2,657	2,676	[illegible]	3,131	2,669	2,408	2,361	3,123	30,414	[illegible]
Residual fuel oil	438	152	717	324	462	238	[illegible]	557	355	409	218	353	4,571	[illegible]
Jet fuel, total	[illegible]	2,264	[illegible]	[illegible]	1,814	1,735	[illegible]	[illegible]	1,664	[illegible]	1,627	2,136	[illegible]	[illegible]
Naphtha-type	423	715	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	411	461	251	[illegible]	791	[illegible]	[illegible]
Kerosine-type	2,133	1,549	1,491	1,172	1,152	936	1,508	963	1,203	1,305	[illegible]	1,345	15,351	[illegible]
Lubricating oil	106	126	166	146	234	114	190	147	175	100	220	151	[illegible]	[illegible]
Wax	96	-	-	-	-	-	48	-	-	-	-	-	144	[illegible]
Asphalt and road oil	311	243	645	358	565	401	460	657	541	367	464	276	5,308	[illegible]
Liquefied gases	231	215	151	56	70	70	79	-	95	153	53	131	1,304	[illegible]
Petrochemical feedstocks	32	79	135	99	20	66	59	50	50	72	36	71	739	[illegible]
Other products	77	45	74	34	58	[illegible]	41	32	37	76	38	22	557	[illegible]
Total	16,726	17,758	16,770	[illegible]	[illegible]	[illegible]	16,279	[illegible]	14,852	13,839	12,657	17,931	190,042	[illegible]

(Source 28)

Transportation of petroleum products by pipeline between the districts of the United States, by months, [illegible] and year, [illegible]

(Thousands of barrels)

Items	January	February	March	April	May	June	July	August	September	October	November	December	Total	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(Source 28)

-Movements of petroleum products on the Ohio River and the Great Lakes from P.A.D. Dist. II to P.A.D. Dist. I: 1973 and 1972

	Total products	Gasoline	Jet fuel	Kerosine	Distillate	Residual	Other
1973							
Via Great Lakes	2,850	1,080	22	29	858	429	432
Via Ohio River	9,013	4,719	150	109	1,850	367	1,818
Total	11,863	5,799	172	138	2,708	796	2,250
1972							
Via Great Lakes	2,702	697	-	26	1,178	283	518
Via Ohio River	9,138	4,047	97	63	1,554	1,515	1,862
Total	11,840	4,744	97	89	2,732	1,798	2,380

Source: Corps of Engineers, U.S. Army.

(Source 28)

[illegible] of the crude and method of transportation Year [illegible]
(Thousands of barrels)

State and District	Crude runs to stills	[illegible]	By State of origin of domestic crude	Change in refinery stocks	Refinery receipts of domestic crude: By receiving State and method of transportation: Intrastate: Pipelines	Intrastate: Tank cars and trucks	Intrastate: Tankers and barges	Interstate: Pipelines	Interstate: Tank cars and trucks	Interstate: Tankers and barges	Refinery receipts of foreign crude: Pipelines	Refinery receipts of foreign crude: Tankers and barges
Delaware, Maryland	[illegible]	[illegible]	-	+11[illegible]	-	-	-	-	-	5,357	-	41,961
Fla., Ga., Va.	21,086	2	12,[illegible]	+1[illegible]	-	-	-	-	706	795	-	19,969
New Jersey, Rhode Isl.	[illegible]	-	-	+21,8[illegible]	-	-	-	-	-	28,4[illegible]	-	191,415
New York	[illegible]	[illegible]	[illegible]	-1	-	-	-	[illegible]	-	-	36,103	-
Pennsylvania East	[illegible]	[illegible]	-	+1,[illegible]	-	-	-	-	-	31,050	-	104,400
West	22,144	12	1,941	+11[illegible]	1,2[illegible]	446	-	6,517	2,137	1,667	9,846	-
West Virginia	5,907	-	2,[illegible]	-1	1,404	44	-	3,963	62	215	-	-
District I	[illegible]	30[illegible]	5[illegible]	+1,[illegible]	4,781	5[illegible]	-	9,717	3,469	5[illegible],486	45,949	402,125
Illinois	576,[illegible]	[illegible]	27,03[illegible]	+1[illegible]	16,759	114	-	506,373	-	-	63,771	-
Indiana	173,43[illegible]	10	7,19[illegible]	+14[illegible]	5,044	45	-	174,954	42	1,125	35,353	-
Kansas	136,29[illegible]	4[illegible]	71,1[illegible]	+225	61,356	551	-	54,500	108	-	8,955	-
Kentucky, Tennessee	51,[illegible]	5[illegible]	5,040	+114	2,506	451	-	40,012	54	10,190	9,615	-
Michigan	44,55[illegible]	1[illegible]	14,01[illegible]	+137	7,833	2,155	-	33,374	-	-	19,409	-
Minnesota, Wisconsin	75,[illegible]	-	-	-154	-	-	-	6,991	-	-	64,598	-
Missouri, Nebraska	36,384	-	4,016	+1	11	-	-	35,561	107	-	1,205	-
North Dakota, S.Dakota	17,682	-	19,363	+4[illegible]	11,977	117	-	1,173	11	-	2,707	-
Ohio East	19,935	-	947	+42	599	-	-	9,555	-	-	5,666	-
West	[1]106,577	10	5,[illegible]01	+76	-	-	-	117,573	-	-	[2]44,910	-
Oklahoma	165,214	146	184,770	+13	11[illegible]	3,009	-	43,597	-	-	175	-
District II	1,[illegible],995	4[illegible]3	[illegible],047	+1,20[illegible]	[illegible],347	7,602	-	769,405	322	11,323	360,566	-
Alabama	11,[illegible]11	11[illegible]	12,15[illegible]	+[illegible]	140	31	1,06[illegible]	4,143	93	5,806	-	272
Arkansas	17,907	[illegible]	17,014	+15	12,775	608	-	4,318	106	-	-	-
Louisiana	[illegible]	16	[illegible]	+6[illegible]	325,44[illegible]	4,440	79,8[illegible]	94,630	644	16,517	-	16,510
Mississippi	33,452	-	[illegible],12[illegible]	-[illegible]	17,5[illegible]4	1,8[illegible]3	-	75,846	-	-	-	-
New Mexico	15,[illegible]52	10	9[illegible],6[illegible]	+4[illegible]	14,141	2,678	-	-	130	-	-	-
Texas	1,171,026	322	1,[illegible],[illegible]41	+6,782	732,906	5,50[illegible]	21,021	67,769	111	94,033	-	128,872
District III	1,344,9[illegible]	4[illegible]2	[illegible],101,17[illegible]	+1,792	1,1[illegible]6,004	15,098	101,944	366,736	1,134	116,352	-	145,654
Colorado	24,177	27[illegible]	54,[illegible]	-[illegible]	1,577	1,294	-	9,150	1,944	-	21	-
Montana	47,867	13	33,12[illegible]	-130	9,170	764	-	19,797	10	-	[5]15,01[illegible]	-
Utah	42,376	9[illegible]	32,03[illegible]	-14	7,201	5,075	-	24,947	1,31[illegible]	-	1[illegible]3	-
Wyoming	51,3[illegible]	1	151,131	-8	46,117	3[illegible]0	-	1,3[illegible]	404	-	2,340	-
District IV	151,5[illegible]1	3[illegible]8	[illegible]	-411	65,545	10,396	-	55,207	3,693	-	17,90[illegible]	-
California	555,[illegible]	186	346,9[illegible]	-296	286,626	7,023	46,71[illegible]	8,943	3,632	46,017	-	178,396
Other States[3]	145,353	101	62,[illegible]42	-1,134	17,534	417	-	-	529	5,641	36,216	31,[illegible]
District V	701,010	2[illegible]	413,4[illegible]5	+[illegible]	304,165	7,440	46,915	8,943	3,761	54,5[illegible]	38,216	207,33[illegible]
United States, total	4,537,254	1,807	3,361,73[illegible]	+6,640	1,7[illegible]6,89[illegible]	43,6[illegible]	146,8[illegible]	1,108,101	12,3[illegible]	249,319	[4]408,740	775,331
Daily Average	12,431	5	9,210	+18	4,923	125	400	3,036	34	684	1,120	2,124

[1] Includes 306,[illegible]81,000 barrels in Delaware River Valley.
[2] Includes some Athabasca hydrocarbons.
[3] Alaska, Arizona, Hawaii, Nevada, Oregon, and Washington.
[4] Excludes crude oil imported for direct fuel use by pipeline.
[5] Includes [illegible] by trucks.

(Source 28)

-**Shipments of aviation fuels in 1973 and 1972**
(Thousands of barrels)

Product and use	Shipments to P.A.D. Districts:					United States Total
	I	II	III	IV	V	
1973:						
I. Aviation gasoline:						
A. For commercial use, total	2,982	3,160	2,144	661	2,561	[illegible],508
1. Airlines	575	487	308	16	136	1,522
2. Factory	45	70	33	6	70	224
3. General aviation	2,362	2,603	1,803	639	2,355	9,762
B. For military use	1,264	975	1,131	63	1,502	4,935
II. Jet fuel:						
A. For commercial use, total	109,090	61,206	22,656	8,049	78,768	279,769
1. Kerosine-type, total	106,296	60,876	21,886	8,049	74,33[illegible]	271,442
a. Airlines	102,027	57,068	20,317	7,626	72,874	259,912
b. Factory	858	1,276	292	-	562	2,988
c. General aviation	3,411	2,532	1,277	423	899	8,542
2. Naphtha-type, total	2,794	330	770	-	4,413	8,307
a. Airlines	2,503	4	661	-	4,254	7,422
b. Factory	224	142	15	-	100	481
c. General aviation	67	184	94	-	59	404
B. For military use, total[1]	24,112	13,067	13,840	3,162	31,850	86,031
1. JP-4	[1]13,137	12,939	13,184	3,162	[1]18,168	60,590
2. JP-5	[1]10,783	117	653	-	[1]13,411	24,964
3. Other	192	11	3	-	271	477
C. Non-aviation use	4,630	1,266	150	-	303	6,349
1972:						
I. Aviation gasoline:						
A. For commercial use, total	2,843	3,103	1,762	486	2,513	10,707
1. Airlines	385	225	149	28	138	925
2. Factory	46	39	15	1	51	152
3. General aviation	2,412	2,839	1,598	457	2,324	9,630
B. For military use	2,207	794	1,002	190	1,733	5,926
II. Jet fuel:						
A. For commercial use, total	103,016	58,667	20,923	7,324	78,467	268,397
1. Kerosine-type, total	100,354	58,379	20,881	7,322	74,882	261,818
a. Airlines	92,851	55,057	18,916	6,934	73,185	246,943
b. Factory	626	554	290	-	645	2,115
c. General aviation	6,877	2,768	1,675	388	1,052	12,760
2. Naphtha-type, total	2,662	288	42	2	3,585	6,579
a. Airlines	1,154	7	-	-	3,308	4,469
b. Factory	1,015	166	20	-	20	1,221
c. General aviation	493	115	22	2	257	889
B. For military use, total[2]	27,020	17,047	13,516	2,965	35,537	96,085
1. JP-4	[2]16,935	16,786	11,183	2,650	[2]25,153	72,707
2. JP-5	9,197	249	1,485	-	9,816	20,747
3. Other	888	12	848	315	568	2,631
C. Non-aviation use	6,891	1,464	2	55	409	8,821

[1] Excludes direct imports by the military of naphtha-type jet into: P.A.D. I, 8,993,000 barrels; P.A.D. V, 1,946,000 barrels. Also excludes direct imports by the military of kerosine-type jet into: P.A.D. I, 376,000 barrels; P.A.D. V, 140,000 barrels.

[2] Excludes direct imports by the military of naphtha-type jet into: P.A.D. I, 6,939,000 barrels; P.A.D. V, 2,129,000 barrels.

Definitions of terms used in this table:

1. Aviation gasoline - Any fuel in the gasoline boiling range for use in a piston-type aviation engine.
2. Jet fuel - Any fuel for use in an aviation turbine engine.
3. Airline - Sales to U. S. certificated air carriers, including air freight carriers, international air carriers (if delivery is made in the U. S.), and to such other air carriers as supplemental or nonschedule carriers, air taxi, etc.
4. Factory - Direct sales to airframe and engine manufacturers. Does not include aviation fuels supplied to these accounts for Defense Fuel Supply Center (DFSC).
5. General Aviation - All non-military sales which are not classified as airline or factory. Primarily made up of sales to distributors and airport dealers.
6. Military - Sales to Defense Fuel Supply Center and to other military agencies of the Government.
7. Non-aviation - Sales for use in turbine engines other than aviation turbine engines. Sales to electric utilities are included in this category.

REFINING

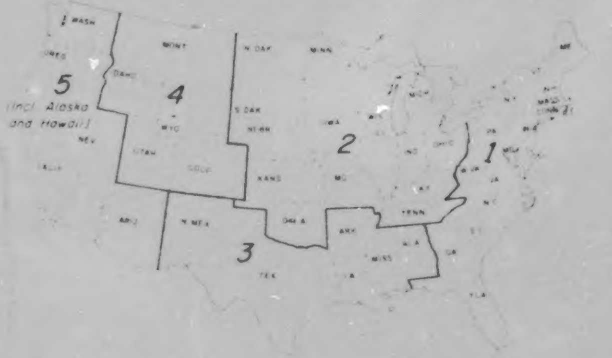
(Source 30)

[illegible]

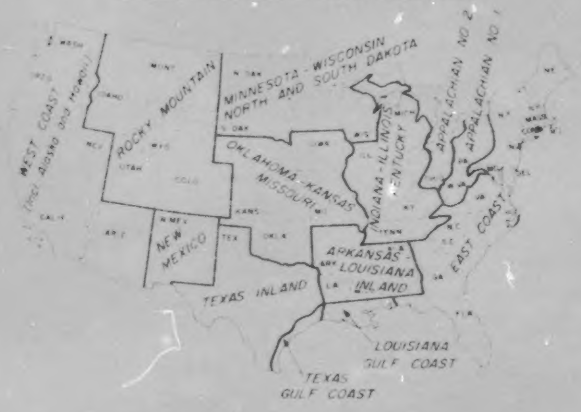
(327)

(Source 30)

PETROLEUM ADMINISTRATION FOR DEFENSE (PAD) DISTRICTS


5
(Incl. Alaska and Hawaii)
4
2
1
3

BUREAU OF MINES REFINING DISTRICTS


WEST COAST
(Incl. Alaska and Hawaii)
ROCKY MOUNTAIN
MINNESOTA - WISCONSIN
NORTH AND SOUTH DAKOTA
OKLAHOMA - KANSAS
MISSOURI
INDIANA - ILLINOIS
KENTUCKY
APPALACHIAN NO 2
APPALACHIAN NO 1
EAST COAST
NEW MEXICO
TEXAS INLAND
ARKANSAS - LOUISIANA INLAND
LOUISIANA GULF COAST
TEXAS GULF COAST

(Source 28)

-Percent refinery yields of the major petroleum products from crude and unfinished oil reruns in the United States: by month, 1973 and year, 1972

Finished Products	1973													1972 Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
Gasoline[1]	44.0	43.1	44.7	46.7	48.4	47.8	47.6	47.0	46.0	45.2	44.2	42.3	45.6	46.2
Jet fuel	6.9	7.3	7.6	7.3	6.8	6.4	6.4	6.6	6.7	6.8	6.8	6.7	6.8	7.2
Ethane (including ethylene)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Liquefied gases	2.8	2.7	2.9	2.9	3.2	2.8	2.9	2.8	2.7	2.7	2.5	2.5	2.8	2.8
Kerosine	2.4	2.7	2.1	1.8	1.3	1.1	1.2	1.3	1.6	1.7	1.7	1.8	1.7	1.8
Distillate fuel oil	24.2	23.9	22.2	20.7	20.5	21.6	21.3	21.7	22.3	22.6	23.4	25.2	22.5	22.2
Residual fuel oil	8.9	8.5	8.0	7.2	7.6	7.0	6.8	6.6	7.0	7.7	8.5	9.3	7.7	6.8
Petrochemical feedstocks	2.8	2.9	2.9	3.1	2.7	2.8	2.8	2.8	2.9	2.9	3.1	3.1	2.9	2.9
Special naphthas	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Lubricants	1.5	1.6	1.6	1.5	1.5	1.4	1.4	1.4	1.4	1.6	1.6	1.6	1.5	1.5
Wax	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1
Coke	2.9	2.9	3.0	3.0	2.9	2.9	2.9	2.9	2.7	2.8	2.8	2.8	2.9	2.8
Asphalt	2.0	2.4	2.7	3.3	3.8	4.3	4.4	4.7	4.8	4.5	3.7	2.9	3.6	3.6
Road oil	-	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.2	0.2
Still gas	3.9	3.8	4.0	4.0	3.9	4.0	4.1	4.0	3.8	3.7	3.5	3.6	3.9	3.9
Miscellaneous	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Shortage	-3.7	-3.3	-3.3	-3.1	-4.3	-3.8	-3.6	-3.6	-3.6	-3.9	-3.4	-3.4	-3.6	-3.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Based on total gasoline output minus input of natural gas liquids and other hydrocarbons.

(Source 28)

Input and output at refineries in the United States, by districts, Year [illegible]
(Thousands of barrels)

Item	P. A. D. District I			P. A. D. District II					P. A. D. District III						P. A. D. Dist. IV	P. A. D. Dist. V	Total
	East Coast	Appalachian #1	Total	Appalachian #2	Ind., Ill., Ky.	Minn., Wisc., etc.	Okla., Kans., Mo.	Total	Texas Inland	Texas Gulf Coast	La. Gulf	N. La. & Ark.	New Mexico	Total	Rocky Mtn.	West Coast	United States
Input																	
Crude petroleum, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Domestic	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Foreign	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Unfinished oils rerun (net)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total crude and unfin. rerun	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Natural gas liquids, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L.P.G.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Natural gasoline	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Plant condensate	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other hydrocarbons[1]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Output																	
Gasoline, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Motor gasoline	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aviation gasoline	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jet fuel, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Naphtha-type	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kerosine-type	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ethane (incl. ethylene)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L.P.G., total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
For fuel use	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
For chemical use	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kerosine	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Distillate fuel oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Residual fuel oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Petrochemical feedstocks, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Still gas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Naphtha-400°	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Special naphthas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lube oil, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bright stock	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Neutral	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other grades	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wax[2]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Coke	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Asphalt	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Road oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Still gas for fuel	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Processing gain (-) or loss (+)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[1] Includes some Athabasca hydrocarbons.
[2] Includes: microcrystalline, [illegible]; crystalline-fully refined, [illegible]; and crystalline-other, [illegible].

(Source 35)

-SUMMARY OF 1974 REFINERY CAPACITY CHANGES (OPERABLE REFINERIES)
(Thousands of Barrels Per Calendar Day)

	PAD District					TOTAL
	I	II	III	IV	V	
Capacity, January 1, 1974	1,673.5	3,889.4	5,932.9	505.7	2,248.2	14,249.9
Expansions	63.4	157.6	201.5	22.9	153.6	599.0
New	14.0	5.0	132.4	10.0	9.6	171.0
Rehabilitations	-	33.7	36.5	7.7	17.0	94.9
Shutdowns	-70.0	-47.0	0	-1.0	0	-118.0
Rating Changes	- 9.8	-39.7	-67.1	-15.2	-48.9	-180.7
Capacity, December 1, 1974	1,671.1	3,999.0	6,236.2	530.1	2,379.5	14,815.9
Estimated net increases in December	--	--	--	--	--	50.0
Estimated capacity, January 1, 1975	--	--	--	--	--	14,865.9

(Source 35)

-REFINERIES PLANNED BUT NOT CONSTRUCTED DUE TO OPPOSITION ON ENVIRONMENTAL GROUNDS

COMPANY	LOCATION	SIZE-BARRELS PER DAY	FINAL ACTION BLOCKING PROJECT
Shell Oil Co.	Delaware Bay, DE	150,000	State reacted by legislature passing bill forbidding refineries in Coastal Area.
Fuels Desulfurization[1]	Riverhead, L.I.	200,000	City Council opposed project and would not change zoning.
Maine Clean Fuels[1]	South Portland, ME	200,000	City Council rejected proposal.
Maine Clean Fuels[1]	Searsport, ME	200,000	Maine Environmental Protection Board rejected proposal.
Georgia Refining Co.[1]	Brunswick, GA	200,000	Blocked through actions of Office of State Environmental Director.
Northeast Petroleum	Tiverton, RI	65,000	City Council rejected proposal.
Supermarine, Inc.	Hoboken, NJ	100,000	Hoboken Project withdrawn under pressure from environmental groups.
Commerce Oil	Jamestown Island RI-Narragansett Bay	50,000	Opposed by local organizations and contested in court.
Steuart Petroleum	Piney Point, MD	100,000	Rejected by St. Mary's County voters by referendum on July 23, 1974.
Olympic Oil Refineries, Inc.[2]	Durham, NH	400,000	Withdrawn after rejection by local referendum.
C. H. Sprague & Son	Newington, NH	50,000	Voted down in community vote on June 28, 1974.
Belcher Oil Co.	Manatee County, FL	200,000	Voted against in referendum September 10, 1974.

[1] Maine Clean Fuels and Georgia Refining Company are subsidiaries of Fuels Desulfurization and the refinery in question is the same in each case, so the capacity in barrels per day is not additive, but the incidents are independent and additive.

[2] Olympic is still considering other nearby sites.

(Source 28)

Fuels consumed for all purposes at refineries in the United States, by States: 1973 and 1972

	Crude oil (1,000 bbls.)		Distillate fuel oil (1,000 bbls.)		Residual fuel oil (1,000 bbls.)		Liquefied petroleum gas (1,000 bbls.)		Natural gas (Mil. cu. ft.)		Refinery gas (Mil. cu. ft.)		Petroleum coke¹ (1,000 s.t.)		Coal (1,000 s.t.)		Purchased electricity (Mil. kwhs.)		Purchased steam (Mil. lbs.)	
	1973	1972	1973	1972	1973	1972	1973	1972	1973	1972	1973	1972	1973	1972	1973	1972	1973	1972	1973	1972
Arkansas	34	-	97	14	194	161	51	156	5,079	5,990	2,944	3,781	-	7	-	-	70	77	-	-
California, Washington, Oregon, Hawaii and Alaska	-	-	1,183	1,109	4,939	3,936	3,403	4,645	141,717	133,570	186,482	189,056	1,953	1,403	-	-	5,786	5,666	4,885	6,046
Colorado	-	-	60	158	110	120	105	120	2,130	2,312	3,117	4,648	35	35	-	-	88	98	-	-
Delaware, Mass., R.I., Va.	-	-	5	-	674	457	10	-	1,010	913	24,994	19,757	452	463	-	-	532	490	5,884	7,217
Georgia, N. Car., S. Car., Fla.	-	-	34	-	185	143	93	-	777	750	-	-	-	-	-	-	6	4	-	-
Illinois	-	-	603	215	8,074	7,470	599	556	10,846	10,533	89,520	74,219	1,398	1,020	-	-	2,158	1,905	-	-
Indiana	-	-	11	40	5,866	5,547	81	50	4,405	8,109	42,728	50,143	523	402	-	-	288	329	-	-
Kansas	-	-	1	1	731	918	249	311	33,840	33,860	30,732	28,837	469	282	-	-	671	645	-	-
Kentucky, Tennessee	-	-	-	-	1,517	622	413	598	5,617	5,445	12,194	14,291	165	104	-	-	364	339	-	-
Louisiana²	-	-	1,098	805	1,439	233	1,698	4,035	113,322	103,578	117,087	118,710	1,094	1,050	-	-	2,869	2,703	15,170	12,940
Maryland	-	-	182	6	155	173	-	-	-	-	11	16	-	-	-	-	9	8	-	-
Michigan	-	-	-	83	577	621	162	198	3,147	3,984	7,244	11,469	77	108	-	-	228	315	-	-
Minnesota, Wisc., No. Dak.²	-	-	-	-	1,682	1,635	37	100	1,478	1,194	16,179	15,450	330	255	-	-	440	403	-	-
Mississippi, Alabama	1	-	74	56	213	748	91	76	24,647	24,698	20,312	21,674	148	188	-	-	318	332	1,575	1,497
Missouri, Nebraska	-	-	-	-	55	468	562	1	4,312	4,366	8,693	9,044	140	129	-	-	46	43	-	-
Montana	-	-	-	-	802	966	113	206	5,483	4,635	11,485	11,548	189	162	-	-	285	288	-	-
New Jersey	1	456	286	712	5,931	4,685	48	416	9,531	6,336	37,657	31,545	660	630	-	-	781	840	6,189	5,917
New Mexico	-	-	1	-	25	12	152	202	3,492	2,708	3,158	3,029	39	40	-	-	55	54	-	-
New York	-	-	-	-	622	493	558	571	-	-	8,545	9,091	84	47	-	-	191	196	-	-
Ohio	-	-	79	272	1,534	2,042	183	197	20,055	21,818	48,459	48,752	468	448	15	7	1,165	1,196	-	-
Oklahoma	3	-	151	33	76	41	108	220	48,243	48,876	43,300	33,373	432	325	-	-	689	684	-	-
Pennsylvania	-	-	475	546	6,839	5,903	4	75	19,777	21,014	65,200	66,903	488	534	291	299	1,246	1,295	191	145
Texas	-	1	1,200	248	269	643	1,238	488	593,968	577,459	283,161	268,620	3,769	3,302	-	-	4,681	4,377	51	58
Utah	-	-	38	1	570	737	146	145	5,107	4,154	8,958	7,701	159	159	-	-	183	166	-	-
West Virginia	-	-	27	-	378	48	-	-	1,198	642	977	1,131	-	-	23	33	77	32	-	-
Wyoming	-	-	1	3	522	573	32	58	14,561	13,809	10,257	10,374	212	137	-	-	136	127	-	-
Total United States²	39	457	5,526	4,478	44,089	39,395	10,136	13,418	1,073,742	1,040,746	[illegible]	1,053,492	[illegible]	11,230	[illegible]	339	[illegible]	[illegible]	33,945	33,870

¹ 1973 includes 139,876 short tons of marketable coke; 1972 includes 156,194 short tons.
² 1972 data revised.

(Source 8)

REFINERY PRODUCTION OF RESIDUAL AND NO. 4 FUEL OIL BY SULFUR CONTENT
BY P.A.D. AND REFINERY DISTRICTS: JAN-NOV 1974
(THOUSANDS OF BARRELS)

P.A.D. AND REFINERY DISTRICTS	RESIDUAL FUEL OIL					NO. 4 FUEL OIL				
	PERCENT SULFUR CONTENT					PERCENT SULFUR CONTENT				
	0-.50	.51-1.00	1.01-2.00	OVER 2.00	TOTAL	0-.50	.51-1.00	1.01-2.00	OVER 2.00	TOTAL
DIST. I. TOTAL	9.667	18.689	11.781	9.971	50.108	742	125	351	-	1.218
EAST COAST. TOTAL	9.345	18.349	6.086	9.971	43.751	260	-	259	-	519
APPL. NO. 1	322	340	5.695	-	6.357	482	125	92	-	699
DIST. II. TOTAL	2.715	23.573	19.493	12.168	57.949	467	632	81	142	1.322
APPL. NO. 2	-	1.741	-	-	1.741	-	-	-	-	-
IND.-ILL.	1.906	19.869	13.572	[illegible].769	43.114	226	541	31	162	960
MINN.-WISC.	253	834	2.482	2.226	5.795	198	89	50	-	337
OKLA.-KANS.	558	1.129	3.439	2.173	7.299	23	2	-	-	25
DIST. III. TOTAL	21.694	41.377	12.575	41.845	117.491	915	1.054	210	164	2.343
TEXAS INLAND	3.523	2.288	1.276	438	7.525	13	15	113	-	141
TEXAS GULF	11.337	20.673	6.258	32.238	70.506	-	360	-	-	360
LA. GULF	2.335	17.179	3.348	6.532	29.394	24[illegible]	353	-	-	596
ARK.-LA. INL.	3.436	127	1.414	2.637	7.614	515	193	97	164	969
NEW MEXICO	1.062	1.110	279	-	2.452	144	133	-	-	277
DIST. IV	2.036	3.156	2.103	3.720	11.015	587	31	188	-	806
DIST. V	51.632	4.725	49.228	6.971	112.556	487	-	56	103	646
U.S. TOTAL	87.744	91.520	95.180	74.675	349.119	3.178	1.842	886	429	6.335

OIL STOCKS

(Source 28)

--Stocks of crude petroleum in the United States by state of origin and month: 1973

(Thousands of barrels)

State of origin	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	763	495	267	449	360	433	265	285	187	450	225	411	228
Alaska	5,271	5,014	3,640	3,810	3,944	2,633	3,897	2,785	2,776	3,287	3,683	4,167	3,564
Arizona	84	78	92	82	84	79	79	85	94	81	72	79	78
Arkansas	663	830	728	781	796	572	820	852	776	545	490	576	494
California	25,380	24,295	24,855	24,812	24,552	24,388	24,229	22,389	21,266	20,069	20,511	18,283	18,809
Colorado	2,910	3,148	3,126	2,721	2,726	2,852	2,896	2,865	3,147	2,958	2,975	2,859	2,939
Florida	670	1,234	1,286	1,065	1,146	1,382	1,408	1,469	983	1,248	1,363	1,588	2,245
Illinois	2,904	3,345	3,251	3,044	3,327	3,374	3,245	3,051	2,846	2,945	3,058	3,003	2,918
Indiana	272	257	175	195	250	510	584	385	452	374	439	422	535
Kansas	5,604	5,233	6,581	5,958	6,145	7,218	6,917	7,781	6,896	6,743	6,936	6,361	6,161
Kentucky	753	453	452	347	373	374	452	386	310	477	502	604	470
Louisiana	30,431	28,481	27,417	29,265	30,667	31,836	30,528	30,136	31,097	29,735	28,926	29,796	28,055
Michigan	505	629	619	768	670	711	629	607	694	714	849	1,088	1,033
Mississippi	3,823	4,674	4,490	4,240	4,289	3,972	3,550	3,260	4,049	3,573	3,444	3,585	3,331
Missouri	-	-	-	-	-	-	-	-	-	-	-	-	1
Montana	3,364	3,529	3,426	3,272	3,556	3,613	3,245	3,262	3,280	3,055	3,124	3,234	2,889
Nebraska	534	741	750	673	657	769	579	551	716	462	562	486	395
Nevada	1	1	1	1	1	1	1	1	1	1	1	-	-
New Mexico	6,042	5,877	6,241	6,709	7,560	7,347	6,561	7,098	6,736	7,262	7,461	7,655	7,102
New York	30	30	30	30	30	30	30	30	30	30	30	30	30
North Dakota	1,469	1,480	1,671	1,626	1,912	1,707	1,611	1,516	1,495	1,616	1,605	1,494	1,417
Ohio	821	903	899	939	950	903	793	795	824	879	947	934	929
Oklahoma	13,144	11,772	12,099	11,416	11,186	12,233	11,627	11,273	11,706	11,773	12,897	13,165	12,254
Pennsylvania	667	716	652	606	579	599	544	662	625	558	554	591	573
Texas	93,120	87,617	86,109	90,105	90,379	95,535	93,107	88,035	91,101	89,950	89,810	91,069	92,999
Utah	2,377	2,782	2,505	3,101	2,840	3,126	2,762	2,635	2,647	2,886	2,878	2,854	3,195
West Virginia	602	563	540	585	606	569	603	609	566	509	524	556	531
Wyoming	14,824	14,416	14,633	15,784	17,462	18,741	18,093	17,064	15,176	14,287	14,617	14,592	13,889
Total domestic crude	217,028	208,593	206,535	212,384	217,047	225,507	219,055	209,867	210,476	206,467	208,483	209,482	207,064
Foreign crude:													
Districts I-IV	18,654	20,945	21,140	18,928	21,662	21,638	20,710	22,973	24,965	23,417	25,777	27,334	24,194
District V	10,713	7,931	7,687	12,819	10,074	10,722	9,092	10,833	12,873	11,392	12,037	13,182	11,220
Total foreign crude	29,367	28,876	28,827	31,747	31,736	32,360	29,802	33,806	37,838	34,809	37,814	40,516	35,414
Total crude stocks	246,395	237,469	235,362	244,131	248,783	257,867	248,857	243,673	248,314	241,276	240,297	249,998	242,478
Pennsylvania grade (included above)	1,707	1,810	1,739	1,783	1,793	1,796	1,687	1,856	1,754	1,647	1,698	1,843	1,767

(Source 28)

-Stocks of crude petroleum in the United States by locations and month: 1973

(Thousands of barrels)

State	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	854	682	879	766	1,042	885	536	639	563	536	549	587	906
Alaska	1,020	1,432	805	714	1,198	976	720	657	705	912	868	862	436
Arizona	444	445	447	447	444	445	448	446	450	447	449	450	452
Arkansas	999	1,355	1,08[illegible]	1,309	1,317	1,034	1,343	1,372	1,295	1,057	1,014	1,116	1,038
California, Nevada, Oregon, Washington	40,133	35,596	35,047	40,384	37,427	36,938	36,490	35,100	36,052	33,945	35,615	34,642	32,645
Colorado	1,863	1,843	1,812	1,825	1,723	1,853	1,861	1,852	1,838	1,610	1,831	1,892	1,861
Florida, Georgia, South Carolina, Virginia	1,377	1,320	825	1,082	1,304	1,240	1,536	1,431	1,062	1,599	1,631	1,318	1,617
Hawaii	717	892	2,015	1,215	714	818	783	999	1,094	659	644	1,028	1,468
Illinois	16,084	15,346	14,501	16,223	16,675	17,596	16,963	16,007	15,732	17,216	16,273	15,617	14,734
Indiana	3,427	3,494	3,623	3,358	3,489	3,673	3,559	3,264	3,242	3,225	3,103	3,165	3,361
Iowa, Missouri	6,188	6,406	6,110	6,172	6,378	6,670	6,151	6,369	5,904	5,940	6,592	6,077	6,041
Kansas	9,228	9,012	9,987	10,114	10,179	11,484	11,200	11,715	11,139	10,902	11,253	10,209	9,800
Kentucky, Tennessee	4,189	4,422	4,175	4,056	3,910	3,664	3,562	3,306	3,808	3,787	4,028	4,238	3,946
Louisiana	18,893	21,592	17,944	18,809	18,941	20,521	18,966	19,461	20,714	20,450	20,129	21,536	18,702
Maryland	262	206	237	228	249	400	421	354	304	311	257	300	277
Massachusetts, Delaware, Rhode Island	610	1,457	798	1,088	611	515	541	836	1,557	1,217	989	754	484
Michigan	2,734	3,506	2,486	1,868	1,998	1,866	1,710	1,690	1,859	2,026	2,404	2,189	2,325
Minnesota, Wisconsin	2,127	2,311	2,543	2,869	2,806	2,233	1,871	2,078	1,752	1,984	2,394	2,572	1,978
Mississippi	5,708	6,176	5,552	5,244	5,287	4,899	4,819	4,680	4,998	5,042	4,716	4,749	4,898
Montana	3,032	3,042	2,657	2,325	2,781	2,693	2,465	2,811	2,499	2,446	2,471	2,647	2,624
Nebraska	1,434	1,494	1,528	1,700	1,641	1,651	1,474	1,477	1,575	1,433	1,524	1,520	1,570
New Jersey	4,503	5,269	5,119	4,943	6,096	6,062	6,369	4,941	5,357	5,011	5,127	5,679	6,527
New Mexico	3,636	3,674	3,453	3,636	3,683	3,629	3,841	3,667	3,729	3,838	3,844	4,038	3,773
New York	386	477	500	374	361	455	471	405	439	329	471	419	385
North Dakota	1,288	1,294	1,493	1,322	1,648	1,478	1,373	1,317	1,331	1,445	1,392	1,262	1,172
Ohio	5,811	5,334	5,164	4,809	6,234	7,440	6,692	5,693	5,940	5,755	6,575	6,283	5,573
Oklahoma	14,984	13,737	14,405	14,453	14,982	15,842	15,006	15,138	16,238	16,051	17,791	18,671	16,925
Pennsylvania	6,545	7,014	7,400	6,092	7,427	7,030	6,465	6,736	7,540	5,906	8,165	8,410	8,319
Texas	78,331	69,385	74,468	76,763	76,737	81,642	79,070	78,600	79,731	77,096	75,241	78,784	79,388
Utah	1,174	1,194	1,181	1,234	1,3[illegible]2	1,288	1,271	1,295	1,108	1,038	1,171	1,153	1,130
West Virginia	627	583	568	588	594	554	563	601	563	601	581	559	509
Wyoming	7,787	7,479	7,552	8,121	9,445	10,393	10,277	8,734	8,196	7,462	7,205	7,272	7,616
Total	246,395	237,469	235,362	244,131	248,783	257,867	248,857	243,673	248,314	241,276	244,287	249,998	242,478

(Source 28)

Stocks of crude petroleum in the United States by classification and location, end month, [illegible]

(Thousands of barrels)

Classification and location	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(Source 26)

Note.—Bulk terminal stocks include only those held in terminals operated by refining and pipeline companies.

[1] Includes bulk terminal stocks: Lubes, [illegible]; Asphalt, [illegible]; and Miscellaneous, [illegible].

[2] Includes No. 4 fuel oil, in thousands of barrels: P.A.D. District I, [illegible]; P.A.D. District II, [illegible]; P.A.D. District III, [illegible]; P.A.D. District IV, [illegible]; P.A.D. District V, [illegible].

[3] Includes microcrystalline, [illegible]; crystalline-fully refined, [illegible]; and crystalline-other, [illegible].

(Source 8)

STOCKS OF RESIDUAL AND NO. 4 FUEL OIL HELD BY REFINERIES AND BULK TERMINALS BY SULFUR CONTENT
BY P.A.D. AND REFINERY DISTRICTS: NOV 30, 1976
(THOUSANDS OF BARRELS)

P.A.D. AND REFINERY DISTRICTS	RESIDUAL FUEL OIL					NO. 4 FUEL OIL				
	PERCENT SULFUR CONTENT					PERCENT SULFUR CONTENT				
	0-.50	.51-1.00	1.01-2.00	OVER 2.00	TOTAL	0-.50	.51-1.00	1.01-2.00	OVER 2.00	TOTAL
DIST. I, TOTAL	11,292	4,201	4,419	6,367	26,279	2,932	292	567	180	3,971
REFINERY	2,536	1,358	493	1,012	5,399	511	21	104	-	636
BULK TERMINAL	8,756	2,843	3,926	5,355	20,880	2,421	271	463	180	3,335
EAST COAST, TOTAL	11,149	4,126	3,982	6,380	25,655	2,903	271	567	180	3,921
REFINERY	2,393	1,362	176	1,012	4,979	482	-	104	-	586
BULK TERMINAL	8,756	2,764	3,806	5,368	20,676	2,421	271	463	180	3,335
NEW ENGLAND	980	490	202	553	2,225	520	56	133	21	730
CNTRL ATLANTIC	7,776	2,257	2,850	1,500	14,383	1,901	217	229	159	2,506
LOWER ATLANTIC	-	19	756	1,295	4,068	-	-	101	-	101
APPL. NO. 1, TOTAL	103	77	437	7	624	29	21	-	-	50
REFINERY	103	-	317	-	420	29	21	-	-	50
BULK TERMINAL	-	77	120	7	204	-	-	-	-	-
DIST. II, TOTAL	179	3,018	3,108	1,171	7,476	7	62	-	-	69
REFINERY	179	2,049	2,291	1,171	5,710	7	62	-	-	69
BULK TERMINAL	-	969	817	-	1,766	-	-	-	-	-
APPL. NO. 2, TOTAL	-	353	-	-	353	-	-	-	-	-
REFINERY	-	75	-	-	75	-	-	-	-	-
BULK TERMINAL	-	278	-	-	278	-	-	-	-	-
IND.-ILL., TOTAL	35	2,391	1,951	614	4,991	-	62	-	-	62
REFINERY	35	1,721	1,234	614	3,604	-	62	-	-	62
BULK TERMINAL	-	670	717	-	1,387	-	-	-	-	-
MINN.-WISC., TOTAL	133	1	764	165	1,063	5	-	-	-	5
REFINERY	133	-	664	165	962	5	-	-	-	5
BULK TERMINAL	-	1	100	-	101	-	-	-	-	-
OKLA.-KANS., TOTAL	11	273	393	392	1,069	2	-	-	-	2
REFINERY	11	273	393	392	1,069	2	-	-	-	2
BULK TERMINAL	-	-	-	-	-	-	-	-	-	-
DIST. III, TOTAL	1,350	5,047	556	3,718	10,671	31	264	69	35	399
REFINERY	709	2,508	387	3,104	6,708	31	264	69	-	364
BULK TERMINAL	641	2,539	169	614	3,963	-	-	-	35	35
TEXAS INLAND, TOTAL	212	34	95	53	394	10	3	65	-	78
REFINERY	212	34	95	53	394	10	3	65	-	78
BULK TERMINAL	-	-	-	-	-	-	-	-	-	-
TEXAS GULF, TOTAL	492	2,955	258	2,457	6,162	-	195	-	-	195
REFINERY	361	1,470	111	2,360	4,302	-	195	-	-	195
BULK TERMINAL	131	1,485	147	97	1,860	-	-	-	-	-
LA. GULF, TOTAL	587	1,325	493	877	3,282	-	33	-	35	68
REFINERY	77	857	471	360	1,765	-	33	-	-	33
BULK TERMINAL	510	468	22	517	1,517	-	-	-	35	35
ARK.-LA. INL., TOTAL	36	204	107	331	678	12	29	4	-	45
REFINERY	36	18	107	331	492	12	29	4	-	45
BULK TERMINAL	-	186	-	-	186	-	-	-	-	-
NEW MEXICO, TOTAL	25	129	3	-	157	9	4	-	-	13
REFINERY	25	129	3	-	157	9	4	-	-	13
BULK TERMINAL	-	-	-	-	-	-	-	-	-	-
DIST. IV, TOTAL	220	287	352	326	1,185	3	-	15	-	18
REFINERY	220	287	352	326	1,185	3	-	15	-	18
BULK TERMINAL	-	-	-	-	-	-	-	-	-	-
DIST. V, TOTAL	5,376	381	7,828	767	14,352	6	-	-	1	7
REFINERY	4,679	377	4,785	732	10,573	-	-	-	-	-
BULK TERMINAL	697	4	3,043	35	3,779	6	-	-	1	7
U.S. TOTAL	18,417	12,934	16,263	12,349	59,963	2,979	618	651	216	4,464
REFINERY	8,323	6,579	8,308	6,345	29,575	552	347	188	-	1,087
BULK TERMINAL	10,094	6,355	7,955	6,004	30,388	2,427	271	463	216	3,377

SALES, PRICES, AND INCOME

(Source 16)

Crude price changes in Mid-Continent, California and West Texas, by years
(Dollars per barrel)

Date	Okla. Kans. 36-36.9° Gravity	Calif. Long Beach 27-27.9°	West Texas Sour 30-30.9°
1937: Prior to Jan. 1	$1.10	$1.10	$0.70
January 20	1.22		0.88
1938: October 12	1.02		0.75
1939: No changes			
1940: February 1		1.03	
1941: March 29			0.82
April 1	1.07		
April 24		1.09	
May 20	1.17		
May 21			0.92
May 23		1.15	
1942: Feb. 3; frozen at Oct. 1, 1941 level	1.17	1.15	0.92
1943: 1944; 1945: No changes; price frozen			
1946: April 1: OPA raise	1.27	1.25	1.02
July 25: Oil prices decontrolled	1.52		1.27
August 1		1.50	
November 15	1.62		
November 19			1.37
1947: March 10	1.87		1.62
March 19		1.75	
July 1		1.95	
October 15	2.07		
October 16			1.82
December 6	2.57		2.32
December 27		2.45	
1948: No change			
1949: June 1		2.37	
1950: December 12		2.41	
1951: Frozen at Jan. 25 level	2.57	2.41	2.32
1952: No changes; frozen			
1953: Feb. 16: decontrolled		2.76	
June 15	2.83		2.57
1954: No change			
1955: No change			
1956: November 21		$2.92	
1957: January 3	$3.07		$2.82
January 17		3.17	
1958: June 24		3.06	
October 3	{2.93 {3.00		
1959: January 26		2.95	
February 4			2.65
February 20	2.97		
September 11		2.74	
1960: No changes			
1961: No changes			
1962: No changes			
1963: No changes			
1964: April 15	2.92		
1965: No changes			
1966: May-Sept.	{2.97 {3.00		2.75
Nov. 1			2.80
1967: August 1	3.07		
1968: June 13	3.12		
1969: March 1	3.17	2.84	3.06
1970: December	3.52	3.19	3.30
1971: June 11			3.35
1972: No changes			
1973: December, old oil	5.17	4.79	5.00
1973: December, new oil	9.50	9.49	9.51
1974: December, old oil	5.17	4.79	5.00
1974: December, new oil	11.07	10.36	10.85

(Source 29)

--Total Sales of Distillate-Type and Residual-Type Fuel Oils in the United States, by P.A.D. District and State: 1973 and 1972

(Thousand barrels)

P.A.D. District and State	Total distillate-type oils[1]		Total residual-type oils	
	1973	1972	1973	1972
District I:				
New England, total	122,320	124,303	163,456	166,727
Connecticut	34,761	34,735	43,180	40,706
Maine	12,047	12,744	18,260	21,365
Massachusetts	62,570	63,616	[illegible]	87,930
New Hampshire	8,104	8,361	[illegible]	5,961
Rhode Island	8,633	9,176	[illegible]	9,811
Vermont	5,901	5,729	[illegible]	954
Delaware	4,482	4,298	12,767	9,645
District of Columbia	3,462	1,314	10,850	10,698
Florida	[illegible]	19,498	82,673	76,325
Georgia	19,478	16,471	13,788	12,969
Maryland	22,391	21,435	41,443	38,273
New Jersey	[illegible]	77,639	78,506	80,761
New York	119,000	123,075	188,469	184,123
North Carolina	24,998	23,030	14,793	15,926
Pennsylvania	89,491	75,717	57,771	58,490
South Carolina	10,456	9,732	9,394	8,195
Virginia	26,461	25,020	45,923	44,530
West Virginia	5,922	5,332	3,449	3,748
Total	[illegible]	518,334	701,179	686,554
District II:				
Illinois	53,961	53,276	28,145	29,581
Indiana	34,253	34,233	15,725	14,326
Iowa	15,267	14,815	479	375
Kansas	10,120	9,166	2,867	1,974
Kentucky	15,411	9,470	1,094	1,119
Michigan	47,849	48,640	14,160	11,568
Minnesota	26,968	23,979	7,069	6,463
Missouri	16,987	16,107	3,159	3,552
Nebraska	9,462	9,092	519	706
North Dakota	4,724	4,135	898	161
Ohio	43,415	43,014	6,888	5,400
Oklahoma	8,415	7,828	1,619	1,555
South Dakota	4,361	4,169	234	335
Tennessee	15,510	16,218	650	523
Wisconsin	27,964	26,281	2,681	2,196
Total	[illegible]	[illegible]	[illegible]	[illegible]
District III:				
Alabama	13,558	12,983	6,093	[illegible]
Arkansas	3,561	9,072	13,729	[illegible]
Louisiana	24,913	17,846	16,737	[illegible]
Mississippi	13,065	9,413	5,955	2,364
New Mexico	7,918	6,969	1,720	623
Texas	57,367	48,516	18,971	11,151
Total	178,282	103,644	63,669	[illegible]
District IV:				
Colorado	7,631	8,796	2,237	3,796
Idaho	5,297	5,866	259	246
Montana	4,924	4,131	1,755	1,285
Utah	7,797	6,910	3,650	3,138
Wyoming	6,138	5,419	1,457	1,397
Total	[illegible]	30,557	9,457	9,622
District V:				
Alaska	6,582	6,227	951	1,366
Arizona	15,118	9,788	4,248	1,139[2]
California	53,163	45,247	120,059	85,978[2]
Hawaii	5,819	5,622	17,980	18,116
Nevada	3,584	2,924	472	247[2]
Oregon	16,278	11,467	8,439	7,877[2]
Washington	29,616	19,590	9,727	11,851[2]
Total	123,296	99,883	155,796	131,636
United States, total	1,130,657	1,074,875	1,019,934	925,647

[1] Includes 6,368,000 barrels of kerosine-type jet fuel used by electric utility companies in 1973, and 6,821,000 barrels of kerosine-type jet fuel in 1972.

[2] Revised.

(Source 29)

Sales of Distillate-type Heating Oils to the United States, by P.A.D. District and State: 1973 and 1972

(Thousand barrels)

[illegible]

(Source 29)

—Sales of Residual-Type Heating Oils in the United States, by F.A.D. District and State: 1973 and 1972

[Thousand barrels]

F.A.D. District and State	Heating oils					
	No. 5		No. 6		Total	
	1973	1972 1/	1973	1972 1/	1973	1972 1/
District I:						
New England, total	10,301	10,757	34,717	35,099	45,018	45,856
Connecticut	58	64	5,441	4,913	5,499	4,977
Maine	794	867	2,926	3,151	3,720	4,018
Massachusetts	7,721	8,086	22,291	22,694	30,012	30,780
New Hampshire	488	510	1,413	1,613	1,901	2,123
Rhode Island	1,200	1,203	2,224	2,221	3,424	3,424
Vermont	40	30	422	504	462	534
Delaware	285	244	781	252	1,066	496
District of Columbia	459	518	4,618	5,190	5,077	5,708
Florida	20	31	2,525	2,696	2,545	2,727
Georgia	875	890	1,617	1,687	2,492	2,577
Maryland	1,636	1,742	3,642	3,777	5,278	5,519
New Jersey	2,480	2,592	11,277	11,301	13,757	13,893
New York	1,300	1,386	57,810	57,766	59,110	59,152
North Carolina	1,002	1,020	995	409	1,997	1,429
Pennsylvania	7,171	7,216	8,036	8,068	15,207	15,284
South Carolina	145	152	55	55	200	207
Virginia	380	457	1,321	1,282	1,701	1,739
West Virginia	285	488	122	71	407	559
Total	26,139	27,491	127,516	128,055	153,655	155,546
District II:						
Illinois	4,706	4,163	5,242	6,045	9,948	10,208
Indiana	568	592	1,271	1,379	1,839	1,971
Iowa	77	82	226	42	303	124
Kansas	94	23	38	36	132	59
Kentucky	–	–	211	152	211	152
Michigan	473	356	717	691	1,190	1,047
Minnesota	390	410	399	411	789	821
Missouri	788	740	508	422	1,296	1,162
Nebraska	72	99	170	106	242	205
North Dakota	116	93	287	130	403	223
Ohio	114	117	580	713	694	830
Oklahoma	50	32	55	54	105	86
South Dakota	3	4	–	–	3	4
Tennessee	20	16	182	270	202	286
Wisconsin	293	313	380	288	673	601
Total	7,264	7,040	12,666	12,739	19,930	19,779
District III:						
Alabama	524	201	449	123	973	324
Arkansas	67	18	400	254	467	272
Louisiana	4	2	11	8	15	10
Mississippi	–	–	66	100	66	100
New Mexico	7	–	60	21	67	21
Texas	63	25	1,091	647	1,154	672
Total	665	246	2,077	1,153	2,742	1,399
District IV:						
Colorado	56	56	555	480	611	536
Idaho	53	58	112	110	165	168
Montana	161	163	47	46	208	209
Utah	315	339	243	186	558	525
Wyoming	88	87	230	214	318	301
Total	673	701	1,187	1,036	1,860	1,737
District V:						
Alaska	–	–	13	20	13	20
Arizona	–	–	–	–	–	–
California	296	617	2,873	3,064	3,169	3,681
Hawaii	65	113	19	10	84	123
Nevada	66	72	15	17	81	89
Oregon	2,086	2,605	1,220	1,908	3,306	4,513
Washington	1,616	2,423	1,432	2,001	3,048	4,424
Total	4,129	5,830	5,572	7,020	9,701	12,850
United States, total	38,870	41,308	149,018	150,003	187,888	191,311

1/ Revised.

(Source 29)

Sales of All Fuel Oils (Distillate-Type and Residual-Type) for Electric Utility Use, Quantities Burned in Generating Electricity, and Inventories Held by Utility Companies in the United States, by P.A.D. District and State: 1973

(Thousand barrels)

P.A.D. District and State	Electric utility company use			
	Sales 1/	Opening Inventory 2/	Closing Inventory 2/	Burned 2/
District I:				
New England, total	85,776	5,297	5,279	85,989
Connecticut	30,757	2,206	2,370	30,193
Maine	5,046	627	658	5,015
Massachusetts	45,783	1,949	1,810	45,927
New Hampshire	2,103	61	57	2,127
Rhode Island	2,822	138	244	2,574
Vermont	265	113	140	238
Delaware	6,207	185	156	5,938
District of Columbia	5,669	160	161	5,668
Florida	71,095	6,125	7,636	70,586
Georgia	6,634	188	353	6,469
Maryland	26,820	2,358	3,551	25,627
New Jersey	49,261	2,362	2,776	48,830
New York	92,287	7,666	7,286	92,660
North Carolina	6,509	763	612	6,660
Pennsylvania	21,537	839	1,038	21,338
South Carolina	5,311	296	1,267	4,365
Virginia	27,634	851	2,170	26,415
West Virginia	601	59	125	535
Total	406,317	27,122	32,699	400,740
District II:				
Illinois	12,323	1,148	1,689	11,782
Indiana	1,249	166	338	957
Iowa	885	187	660	412
Kansas	1,704	836	1,450	1,090
Kentucky	149	33	33	149
Michigan	12,101	642	1,216	11,527
Minnesota	2,757	369	1,105	2,016
Missouri	1,057	158	509	706
Nebraska	560	255	446	368
North Dakota	17	14	17	14
Ohio	3,641	564	603	3,482
Oklahoma	558	133	336	355
South Dakota	202	80	97	185
Tennessee	231	148	83	296
Wisconsin	1,483	216	309	1,490
Total	38,917	4,806	9,099	36,629
District III:				
Alabama	753	201	158	796
Arkansas	8,583	135	1,630	7,088
Louisiana	7,965	984	1,253	7,696
Mississippi	6,226	392	782	5,836
New Mexico	928	254	397	785
Texas	10,974	2,069	6,741	6,252
Total	35,379	4,035	10,961	28,453
District IV:				
Colorado	831	76	155	752
Idaho	1	1	1	1
Montana	230	28	116	142
Utah	342	94	92	344
Wyoming	101	26	21	106
Total	1,505	225	385	1,345
District V:				
Alaska	585	39	60	564
Arizona	9,353	1,172	2,962	7,563
California	85,071	19,236	30,361	73,946
Hawaii	8,816	526	553	8,787
Nevada	645	167	501	311
Oregon	317	140	446	53
Washington	507	183	212	478
Total	105,294	21,499	35,095	91,698
United States, total	587,407	57,687	88,229	556,865

1/ From Table II.

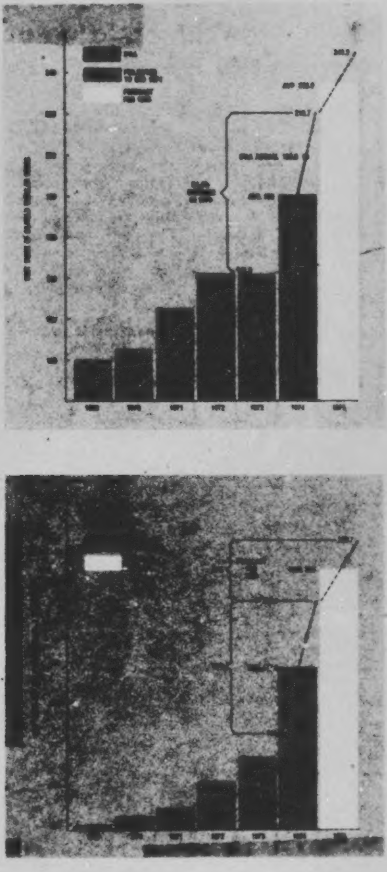
2/ Source: Federal Power Commission.

Price indexes for items used for drilling and equipping wells

				Latest prices*		
	1969	Ave. 1973	End 1973	Price index	Percent change from end 1973	Percent of total well cost
Payments to drilling contractors	100	133.2	145.1[■]	N.A.	N.A.	30.1
Purchased items						
Road and site preparation	100	128.1	137.1	140.0	2.1	6.8
Transportation	100	117.5	118.3	139.2	17.7	2.9
Fuel	100	141.0	179.4	209.9	17.0	0.4
Drilling mud & additives	100	132.9	138.8	184.9	33.2	7.0
Well site logging and/or monitoring system	100	110.6	110.6	122.9	11.1	1.3
All other physical tests	100	119.8	121.9	150.4	23.4	0.8
Logs & wireline evaluation services	100	123.6	124.4	144.9	16.5	3.0
Directional drilling service	100	120.6	130.2	137.2	5.4	0.5
Perforate	100	118.5	119.2	132.6	11.2	1.5
Formation treating	100	113.2	114.3	137.7	20.5	2.9
Cement & cementing service	100	126.5	128.5	158.8	23.6	3.8
Casing, tubing & casing hardware	100	141.6	141.6	198.8	40.4	18.2
Special tool rentals	100	116.4	120.6	138.7	15.0	2.4
Drill bits & reamers	100	117.9	119.7	132.4	10.6	1.4
Wellhead equipment	100	118.2	121.1	141.1	16.5	2.4
Other equipment & supplies	100	118.1	120.9	140.7	16.4	2.0
Plugging	100	138.5	141.6	158.7	12.1	0.7
Supervision & overhead	100	123.7	127.8	142.4	11.4	2.2
All other expenditures	100	118.8	124.7	152.5	22.3	3.7
Subtotal purchased items	100	128.5	131.5	163.8	24.6	63.9

[■] **World Oil estimate**
* Data from June through October 1974
Source — IPAA Cost Study Committee

(Source 16)



The single item having the most effect on rising costs of drilling and equipping wells in the United States was the rising cost of tubular goods. On the average, tubulars rose 54.4% in price (top) with costs in some situations doubling. Payments to contractors also rose significantly, increasing 45% during 1974 (bottom).

(Source 16)

Average number of U.S. drilling rigs in operation, by states

STATE or DISTRICT	1974	1973
Alabama	13	15
Alaska	19	5
Arkansas	17	16
California	82	62
Colorado	46	42
Florida	9	9
Illinois	23	17
Indiana	15	9
Kansas	51	51
Kentucky	25	15
Louisiana	215	216
North Louisiana	31	25
South Louisiana	113	116
Offshore Louisiana	70	75
Michigan	26	20
Mississippi	30	28
Montana	24	19
Nebraska	7	5
New Mexico	78	63
Southeast New Mexico	51	40
Northwest New Mexico	27	23
New York	15	9
North Dakota	11	9
Ohio	30	34
Oklahoma	165	122
Pennsylvania	79*	91
Tennessee	15	9
Texas	527	439
Districts—		
1: South Central	19	22
2: Middle Gulf	27	23
3: Upper Gulf	62	52
4: Lower Gulf	46	37
Offshore	21	9
5: East Central	14	21
6: Northeast	32	21
7-B: North Central	40	24
7-C: West Central	46	33
8: West	152	130
9: North	31	26
10: Panhandle	36	32
Utah	41	36
West Virginia	16	21
Wyoming	108	70
Others	6	3
U.S. average	1,683	1,435

*Revised

MISCELLANEOUS DATA ON PETROLEUM AND PETROLEUM PRODUCTS

(Source A)

IMPORTS OF RESIDUAL FUEL OIL BY PERCENT SULFU
BY COUNTRY OF ORIGIN: JAN-NOV 1974
(THOUSANDS OF BARRELS)

DISTRICT COUNTRY	PERCENT SULFUR CONTENT 0-.50	 .51-1.00	 1.01-2.00	 OVER 2.00	TOTAL
P.A.D. I					
NEW ENGLAND					
CANADA	3.086	1.639	-	4.074	8.799
MEXICO	-	-	-	75	75
BAHAMAS	586	1.712	-	472	2.771
BRITISH W.I.	-	150	308	-	458
TRINIDAD	5.686	7.868	1.373	399	15.323
N.W.I.	7.398	11.725	264	1.850	21.238
VENEZUELA	4.727	3.726	3.480	8.824	20.757
ENGLAND	251	132	121	-	504
NETHERLANDS	-	306	-	222	528
FRANCE	112	-	-	-	112
SOVIET UNION	-	-	-	110	110
ITALY	810	361	-	-	1.171
GREECE	101	-	-	-	101
RUMANIA	-	539	-	-	539
ALGERIA	198	-	-	-	198
GHANA	115	497	-	-	612
NIGERIA	214	-	-	-	214
ANGOLA	-	315	-	-	315
VIRGIN ISLANDS	8.519	-	2.299	-	10.818
TOTAL..........	31.803	28.970	7.845	16.026	84.643
CENTRAL ATLANTIC					
CANADA	2.897	434	1.003	6.464	10.798
MEXICO	-	-	-	230	230
BAHAMAS	12.353	4.233	49	3.674	20.309
BRITISH W.I.	100	-	-	127	227
TRINIDAD	8.156	1.766	5.234	1.960	17.116
N.W.I.	25.447	10.003	1.956	9.539	46.945
COLOMBIA	-	-	502	-	502
VENEZUELA	22.331	8.104	9.865	18.377	58.677
PERU	712	-	-	-	712
BRAZIL	466	-	-	-	466
ENGLAND	275	433	-	-	708
NETHERLANDS	-	699	-	459	1.158
BELGIUM	-	124	-	351	475
FRANCE	425	-	-	-	425
WEST GERMANY	-	-	-	277	277
SOVIET UNION	248	-	-	-	248
SPAIN	881	-	-	-	881
PORTUGAL	-	-	152	-	152
ITALY	6.995	698	368	798	8.859
GREECE	-	-	-	135	135
RUMANIA	-	202	-	-	202
IRAN	-	-	50	54	104
U. ARAB EMIRATES	-	12	360	-	372
INDONESIA	141	-	-	-	141
AUSTRALIA	265	-	-	-	265
ALGERIA	2.445	174	-	-	2.619
GHANA	-	393	120	-	513
NIGERIA	4.053	-	-	124	4.177
ANGOLA	-	138	-	-	138
VIRGIN ISLANDS	38.553	8.125	12.724	2.503	61.904
TOTAL..........	126.743	35.536	32.383	45.073	239.736
LOWER ATLANTIC					
CANADA	-	10	-	-	10
MEXICO	-	-	-	218	218
BAHAMAS	-	1.241	3.736	6.672	11.649
TRINIDAD	14	-	1.630	93	1.736
N.W.I.	141	15.387	3.238	24.532	43.298
COLOMBIA	-	-	617	-	617
VENEZUELA	14	9.565	11.450	36.027	57.055
NETHERLANDS	-	170	120	125	416
BELGIUM	-	-	-	320	320
WEST GERMANY	-	177	-	236	413
PORTUGAL	-	-	64	-	64
ITALY	-	539	217	241	997
LIBYA	-	113	-	-	113
NIGERIA	-	113	-	-	113
VIRGIN ISLANDS	22	-	2.113	12.367	14.501
TOTAL..........	191	27.315	23.184	80.830	131.520

CONTINUED ON NEXT PAGE.

continued on page _____

(Source 8)

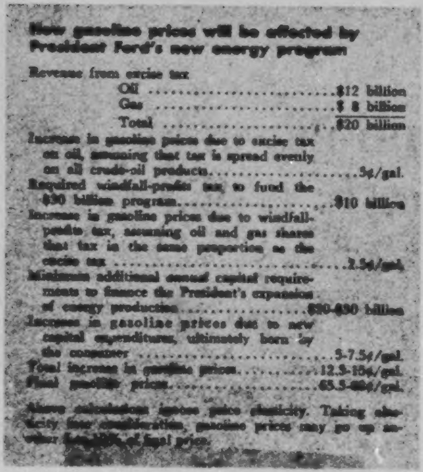
IMPORTS OF RESIDUAL FUEL OIL BY PERCENT SULFUR CONTENT
BY COUNTRY OF ORIGIN (CONTINUED): JAN-NOV 1974
(THOUSANDS OF BARRELS)

DISTRICT COUNTRY	PERCENT SULFUR CONTENT 0-.50	 .51-1.00	 1.01-2.00	 OVER 2.00	TOTAL
P.A.D. II					
CANADA	2.234	1.549	1.691	120	5.633
VENEZUELA	-	369	44	-	413
TOTAL..........	2.234	1.958	1.734	120	6.046
P.A.D. III					
BAHAMAS	126	1.250	-	390	1.765
BRITISH W.I.	149	221	-	-	370
TRINIDAD	-	363	-	234	597
N.W.I.	-	130	-	222	352
COLOMBIA	-	-	30	-	30
VENEZUELA	72	118	530	569	1.289
NETHERLANDS	-	122	-	-	122
RUMANIA	-	246	-	-	246
VIRGIN ISLANDS	176	2.286	20	948	3.429
TOTAL..........	523	4.736	580	2.362	8.200
P.A.D. V					
N.W.I.	2.554	-	37	-	2.590
VENEZUELA	4.416	303	23	-	4.742
ECUADOR	-	150	-	-	150
PERU	691	-	-	-	691
ITALY	320	-	-	-	320
SAUDI ARABIA	79	-	300	-	379
MALAYSIA	20	-	244	59	323
INDONESIA	4.910	-	-	-	4.910
VIRGIN ISLANDS	1.596	-	403	-	1.999
HAWAIIAN F.T. ZONE	-	-	-	-	-
TOTAL..........	14.586	453	1.007	59	16.105
U.S.. TOTAL.......	176.078	98.968	66.732	144.472	[1] 486.250
COUNTRY TOTALS					
CANADA	8.217	3.671	2.694	10.658	25.241
MEXICO	-	-	-	524	524
BAHAMAS	13.065	8.435	3.785	11.207	36.493
BRITISH W.I.	249	371	308	127	1.055
TRINIDAD	13.854	9.997	8.236	2.686	34.773
N.W.I.	35.540	37.245	5.495	36.146	114.423
COLOMBIA	-	-	1.149	-	1.149
VENEZUELA	31.560	22.185	25.391	63.797	142.934
ECUADOR	-	150	-	-	150
PERU	1.403	-	-	-	1.403
BRAZIL	466	-	-	-	466
ENGLAND	526	566	121	-	1.213
NETHERLANDS	-	1.296	120	807	2.223
BELGIUM	-	124	-	671	795
FRANCE	538	-	-	-	538
WEST GERMANY	-	177	-	513	689
SOVIET UNION	248	-	-	110	358
SPAIN	881	-	-	-	881
PORTUGAL	-	-	216	-	216
ITALY	8.125	1.598	585	1.039	11.347
GREECE	101	-	-	135	237
RUMANIA	-	987	-	-	987
IRAN	-	-	50	54	104
SAUDI ARABIA	79	-	300	-	379
U. ARAB EMIRATES	-	12	360	-	372
MALAYSIA	20	-	244	59	323
INDONESIA	5.051	-	-	-	5.051
AUSTRALIA	265	-	-	-	265
ALGERIA	2.643	174	-	-	2.816
LIBYA	-	113	-	-	113
GHANA	115	890	120	-	1.125
NIGERIA	4.266	113	-	124	4.504
ANGOLA	-	453	-	-	453
VIRGIN ISLANDS	48.866	10.411	17.559	15.817	92.652
HAWAIIAN F.T. ZONE	-	-	-	-	-

SOURCE: OFFICE OF OIL AND GAS
NOTE..DATA MAY NOT ADD TO TOTALS SHOWN BECAUSE OF INDEPENDENT ROUNDING

[1] INCLUDES CRUDE OIL FOR DIRECT BURNING AS FUEL CANADA, 1,954; IRAN, 50; NIGERIA, 518; TRINIDAD, 241; UNITED ARAB EMIRATES, 360, VENEZUELA, 2,034.

(Source 16)



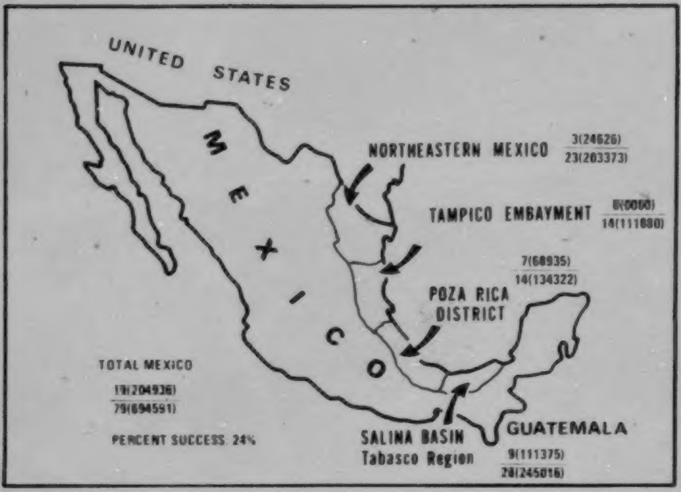
How gasoline prices will be affected by President Ford's new energy program

Revenue from excise tax	
Oil	$12 billion
Gas	$ 8 billion
Total	$20 billion
Increase in gasoline prices due to excise tax on oil, assuming that tax is spread evenly on all crude-oil products	5¢/gal.
Required windfall-profits tax to fund the $30 billion program	$10 billion
Increase in gasoline prices due to windfall-profits tax, assuming oil and gas shares that tax in the same proportion as the excise tax	2.5¢/gal.
Minimum additional annual capital requirements to finance the President's expansion of energy production	$20-$30 billion
Increase in gasoline prices due to new capital expenditures, ultimately born by the consumer	5-7.5¢/gal.
Total increase in gasoline prices	12.5-15¢/gal.
Final gasoline prices	65.5-68¢/gal.

Above calculations ignore price elasticity. Taking elasticity into consideration, gasoline prices may go up another [illegible] of final price.

DRILLING STATISTICS

(Source 11)


UNITED STATES
MEXICO
NORTHEASTERN MEXICO
3(24626)
23(203373)
TAMPICO EMBAYMENT
0(0000)
14(111080)
7(68935)
14(134322)
POZA RICA DISTRICT
TOTAL MEXICO
19(204936)
79(694591)
PERCENT SUCCESS 24%
SALINA BASIN
Tabasco Region
9(111375)
28(245016)
GUATEMALA

Petroleos Mexicanos

INDEX MAP AND EXPLORATORY DRILLING IN MEXICO (1974)

(Source 11)

Total U. S. Drilling Activity, 197[illegible]
By General Class

STATE OR DISTRICT	EXPLORATORY PRO-DUCERS	DRY HOLES	DEVELOPMENT PRO-DUCERS	DRY HOLES	SERVICE	STRATI-GRAPHIC	TOTALS PRO-DUCERS	DRY HOLES	GRAND TOTAL
ALABAMA	[illegible]	49	23	17	[illegible]	0	32	66	98
ALASKA									
ONSHORE	5	7	15	0	0	0	20	7	27
OFFSHORE	0	0	11	0	0	0	11	0	11
TOTAL	5	7	26	0	0	0	31	7	38
ARIZONA	0	5	3	3	0	0	3	8	11
ARKANSAS	10	80	130	87	7	0	140	180	320
CALIFORNIA									
NORTH	16	[illegible]	46	85	3	5	62	131	193
CENTRAL COASTAL	11	41	202	18	17	0	213	72	285
EAST CENTRAL	[illegible]	[illegible]	1216	24	130	0	1228	141	1469
SOUTH	[illegible]	[illegible]	76	3	65	0	74	56	135
OFFSHORE	2	4	42	6	2	0	44	27	71
TOTAL	84	141	1532	173	113	0	1636	517	2153
COLORADO	[illegible]	287	368	[illegible]	7	0	475	474	643
FLORIDA	[illegible]	29	[illegible]	[illegible]	3	0	4	41	44
GEORGIA	0	5	0	0	[illegible]	0	[illegible]	5	5
IDAHO	[illegible]	2	0	0	[illegible]	0	[illegible]	2	2
ILLINOIS	24	187	340	235	[illegible]	0	364	422	877
INDIANA	10	146	131	95	14	0	151	241	[illegible]
IOWA	0	[illegible]	0	0	[illegible]	[illegible]	[illegible]	[illegible]	2
KANSAS	171	214	1247	[illegible]	[illegible]	[illegible]	1418	1447	2865
KENTUCKY	44	160	[illegible]	196	[illegible]	[illegible]	377	376	697
LOUISIANA									
NORTH	[illegible]	169	713	130	19	[illegible]	788	376	1199
SOUTH	[illegible]	273	820	82	3	[illegible]	873	569	1441
OFFSHORE	2	189	355	155	19	[illegible]	357	423	[illegible]
TOTAL	[illegible]	561	1529	595	60	0	1614	1216	2830
MARYLAND	1	[illegible]	0	0	[illegible]	0	1	1	2
MICHIGAN	44	178	88	60	[illegible]	0	[illegible]	146	414
MISSISSIPPI	29	163	60	86	[illegible]	[illegible]	93	257	450
MISSOURI	[illegible]	23	0	0	[illegible]	63	9	47	101
MONTANA	85	136	160	331	8	1	206	460	673
NEBRASKA	16	119	29	46	[illegible]	[illegible]	45	165	230
NEVADA	0	7	0	0	[illegible]	[illegible]	[illegible]	7	[illegible]
NEW MEXICO									
EAST	12	116	312	136	[illegible]	[illegible]	[illegible]	265	573
WEST	4	37	311	26	[illegible]	[illegible]	315	64	384
TOTAL	56	153	752	167	3	[illegible]	813	329	1182
NEW YORK	[illegible]	37	212	11	4	[illegible]	250	47	309
NORTH CAROLINA	0	11	0	0	[illegible]	0	0	11	11
NORTH DAKOTA	[illegible]	63	31	[illegible]	1	0	47	88	128
OHIO	137	35	1495	78	1	1	1617	173	1792
OKLAHOMA	112	784	1785	460	[illegible]	[illegible]	1897	1246	3194
PENNSYLVANIA	51	69	1098	21	[illegible]	[illegible]	1139	185	1327
SOUTH DAKOTA	0	[illegible]	[illegible]	1	0	[illegible]	[illegible]	11	11
TENNESSEE	26	57	45	5	4	[illegible]	71	62	133
TEXAS									
TEXAS RRC DIST. 1	12	189	374	56	[illegible]	[illegible]	386	218	567
TEXAS RRC DIST. 2	163	212	204	99	1	[illegible]	367	315	677
TEXAS RRC DIST. 3	140	299	[illegible]	176	1	[illegible]	511	615	946
TEXAS RRC DIST. 4	[illegible]	191	418	113	1	[illegible]	556	321	877
TEXAS RRC DIST. 5	[illegible]	[illegible]	36	27	[illegible]	[illegible]	68	94	146
TEXAS RRC DIST. 6	[illegible]	[illegible]	128	58	17	[illegible]	159	152	311
TEXAS RRC DIST. 7B	[illegible]	[illegible]	548	154	35	[illegible]	622	502	1214
TEXAS RRC DIST. 7C	53	187	651	63	4	[illegible]	408	241	983
TEXAS RRC DIST. 8	58	89	1117	75	13	7	1145	236	1247
TEXAS RRC DIST. 8A	23	119	627	74	[illegible]	[illegible]	442	290	934
TEXAS RRC DIST. 9	104	113	627	198	[illegible]	[illegible]	[illegible]	433	1153
TEXAS RRC DIST. 10	22	64	118	78	[illegible]	[illegible]	176	142	429
OFFSHORE	17	130	16	3	[illegible]	[illegible]	12	107	161
TOTAL	[illegible]	2047	5838	1317	160	[illegible]	6175	3663	10014
UTAH	[illegible]	40	152	17	[illegible]	[illegible]	[illegible]	58	206
VIRGINIA	0	1	55	13	[illegible]	[illegible]	55	6	61
WEST VIRGINIA	58	44	615	57	[illegible]	[illegible]	673	101	780
WYOMING	73	347	385	133	[illegible]	0	458	443	1001
GULF OF MEXICO - NORTHERN	0	18	0	0	[illegible]	0	0	18	18
TOTAL	2399	6610	18015	5964	1950	[illegible]	20024	17964	32[illegible]

(Source 16)

1974 U.S. completed wells—Majors vs. independents

STATE OR DISTRICT	Majors	Independents	Total
Alabama	**23**	**75**	**98**
Alaska	**18**	**9**	**27**
Arkansas	**22**	**295**	**317**
California	**1,480**	**649**	**2,129**
Colorado	**121**	**818**	**939**
Florida	**12**	**40**	**52**
Illinois	**13**	**585**	**598**
Indiana	**28**	**287**	**315**
Kansas	**110**	**2,968**	**3,078**
Kentucky	**41**	**605**	**646**
Louisiana	**1,548**	**1,625**	**3,172**
North	256	1,029	1,285
South	696	419	1,115
Offshore	596	177	772
Michigan	**272**	**136**	**408**
Mississippi	**45**	**392**	**437**
Montana	**53**	**670**	**723**
Nebraska	**11**	**217**	**228**
New Mexico	**336**	**855**	**1,191**
Southeast	235	501	736
Northwest	101	354	455
New York	**21**	**327**	**348**
North Dakota	**28**	**127**	**155**
Ohio	**97**	**1,540**	**1,637**
Oklahoma	**415**	**2,722**	**3,137**
Pennsylvania	**40**	**1,283**	**1,323**
South Dakota	**5**	**1**	**6**
Tennessee		**186**	**186**
Texas	**2,815**	**7,378**	**10,193**
1: South Central	184	440	624
2: Middle Gulf	56	655	711
3: Upper Gulf	384	602	986
4: Lower Gulf-S.W.	320	571	891
Offshore	68	87	155
5: East Central	12	147	159
6: Northeast	128	172	300
7-B: North Central	25	1,455	1,480
7-C: West Central	264	718	982
8: West	1,116	1,127	2,243
9: North	136	1,008	1,144
10: Panhandle	122	396	518
Utah	**108**	**104**	**212**
West Virginia	**232**	**592**	**824**
Wyoming	**256**	**785**	**1,041**
Others	**32**	**18**	**50**
Total U.S.	**8,182** **(24.4%)**	**25,289** **(75.6%)**	**33,470** **(100%)**

(Source 11)

U.S. Exploratory Drilling Activity, 1974
By States

STATE OR DISTRICT	OUTPOSTS		NEW-POOL WILDCATS		DEEP-POOL TESTS		SHALLOW-POOL TESTS		TOTAL NEW-POOL AND OUTPOSTS		NEW-FIELD WILDCATS		TOTAL EXPLORATORY HOLES		
	PRO-DUCERS	DRY HOLES	PRO-DUCERS	DRY HOLES	PRO-DUCERS	DRY HOLES	PRO-DUCERS	DRY HOLES	PRO-DUCERS	DRY HOLES	PRO-DUCERS	DRY HOLES	PRO-DUCERS	DRY HOLES	GRAND TOTAL
ALABAMA	6	4	0	0	0	1	0	0	6	5	3	44	9	49	58
ALASKA															
ONSHORE	5	0	0	0	0	0	0	0	5	0	0	7	5	7	12
OFFSHORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	5	0	0	0	0	0	0	0	5	0	0	7	5	7	12
ARIZONA	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
ARKANSAS	11	4	7	0	0	0	0	0	18	4	1	90	19	94	[illegible]
CALIFORNIA															
NORTH	9	31	3	10	1	1	0	0	11	45	5	32	16	77	[illegible]
CENTRAL COASTAL	8	35	1	13	3	6	0	0	11	22	0	18	11	41	52
EAST CENTRAL	8	13	2	16	0	7	1	0	11	35	1	26	12	62	74
SOUTH	1	2	1	3	3	0	0	0	4	5	0	2	3	7	10
OFFSHORE	1	1	1	0	0	0	0	0	2	1	0	3	2	4	6
TOTAL	27	81	12	43	3	8	1	0	34	108	6	81	44	191	235
COLORADO	14	19	1	0	2	3	1	2	18	24	33	263	51	287	338
FLORIDA	0	0	0	0	0	0	0	0	0	0	2	28	2	28	30
GEORGIA	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
IDAHO	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
ILLINOIS	11	65	3	19	6	11	3	0	23	98	5	98	28	197	[illegible]
INDIANA	1	8	5	11	2	17	7	2	17	46	7	95	24	144	168
IOWA	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
KANSAS	70	316	30	132	5	6	0	0	108	454	23	262	131	716	847
KENTUCKY	21	37	0	1	8	13	8	1	37	54	7	96	44	150	194
LOUISIANA															
NORTH	6	9	1	0	0	17	0	0	7	26	23	164	30	190	220
SOUTH	25	37	14	63	2	16	1	0	42	117	16	106	53	221	274
OFFSHORE	0	0	0	0	0	0	0	0	0	0	2	149	2	149	151
TOTAL	31	47	15	63	2	27	1	0	44	137	41	424	85	561	646
MARYLAND	0	0	0	1	0	0	0	0	0	1	1	0	1	1	2
MICHIGAN	7	2	0	0	0	1	0	0	7	4	82	169	84	174	258
MISSISSIPPI	19	17	0	0	1	2	0	3	12	22	17	241	29	263	292
MISSOURI	0	0	0	0	0	0	0	0	0	0	1	23	1	23	24
MONTANA	15	37	4	5	1	5	2	0	19	47	23	289	45	336	381
NEBRASKA	2	7	0	0	1	0	0	0	3	7	13	132	16	139	155
NEVADA	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
NEW MEXICO															
EAST	0	0	1	0	6	3	1	3	8	6	44	110	52	116	168
WEST	0	2	0	0	0	1	0	0	0	3	4	34	4	37	41
TOTAL	0	2	1	0	6	4	1	3	8	9	48	144	56	153	209
NEW YORK	2	4	0	0	0	0	0	1	2	5	12	25	19	30	49
NORTH CAROLINA	0	0	0	0	0	0	0	0	0	0	0	11	0	11	11
NORTH DAKOTA	5	4	2	3	0	0	0	0	7	7	6	56	11	63	74
OHIO	102	4	17	6	6	10	11	4	133	24	4	7	137	35	172
OKLAHOMA	15	14	40	117	2	3	1	0	64	134	48	150	112	284	396
PENNSYLVANIA	35	15	2	11	4	4	1	4	51	34	2	48	53	82	[illegible]
SOUTH DAKOTA	0	0	0	0	0	0	0	0	0	0	0	9	0	9	9
TENNESSEE	13	29	4	0	1	0	0	0	15	20	10	37	[illegible]	57	[illegible]
TEXAS															
TEXAS RRC DIST. 1	8	21	19	24	1	1	0	0	28	46	11	101	39	149	188
TEXAS RRC DIST. 2	57	46	9	1	11	2	10	6	141	55	22	158	163	213	376
TEXAS RRC DIST. 3	68	121	53	1	1	5	8	2	121	129	20	157	180	246	426
TEXAS RRC DIST. 4	67	37	3	1	8	11	2	4	76	61	34	136	110	197	307
TEXAS RRC DIST 5	3	0	0	0	2	1	0	0	5	1	7	63	12	68	80
TEXAS RRC DIST 6	7	7	0	0	3	1	1	2	11	10	10	91	21	101	122
TEXAS RRC DIST 7B	4	4	4	15	1	1	1	0	10	20	63	268	73	288	361
TEXAS RRC DIST 7C	6	20	17	28	4	1	4	4	31	61	22	81	53	142	195
TEXAS RRC DIST 8	14	17	19	19	8	1	4	0	45	37	13	57	68	89	157
TEXAS RRC DIST 8A	1	0	5	1	0	1	0	0	6	2	17	117	23	119	142
TEXAS RRC DIST 9	0	0	7	0	0	0	0	0	7	0	97	213	104	213	317
TEXAS RRC DIST 10	0	0	0	0	0	0	0	0	0	0	22	68	22	68	90
OFFSHORE	5	6	4	0	0	1	0	0	9	7	3	131	12	138	150
TOTAL	218	292	138	95	125	16	27	14	499	420	381	1639	840	2067	2907
UTAH	2	6	0	0	0	1	0	0	2	7	6	41	8	48	56
VIRGINIA	4	2	1	0	0	0	0	0	5	2	0	1	5	3	8
WEST VIRGINIA	50	19	6	6	13	4	0	0	64	29	4	15	58	44	102
WYOMING	19	39	1	1	1	4	3	0	24	44	39	353	73	397	470
GULF OF MEXICO - NORTHERN	0	5	0	0	0	0	0	0	0	5	0	9	0	14	14
TOTAL	609	829	299	740	160	153	60	33	1294	1761	715	4847	2009	6610	8619

(Source 16)

U.S. wells drilled to 15,000 feet and deeper (by depth brackets) in 1974

Depth bracket (feet)	Alabama	Florida	Louisiana	Mississippi	New Mexico	Oklahoma	Texas	Utah	Wyoming	Other states	U.S. total 1974	U.S. total 1973
15,000—15,999	18	11	53	4	5	3	25	10	3	3	135	145
16,000—16,999	5	7	36	7	1	2	23	7		1	89	99
17,000—17,999	1		24	5		2	17	6	1		56	75
18,000—18,999	5		8	4		1	18	6	1		43	32
19,000—19,999			11	2		1	5	1		1	21	22
20,000—20,999	1		4	1		3	13			2	24	18
21,000—21,999			1			1	12			1	15	12
22,000—22,999						1	13				14	18
23,000—23,999						1	1				2	3
24,000—24,999							2				2	2
25,000—25,999						1					1	1
26,000—26,999						1					1	
27,000—27,999						1					1	
28,000—28,999												
29,000—29,999												
30,000—30,999												
31,000—31,999						1					1	
Total	30	18	137	23	6	19	129	30	5	8	405	427

U.S. wells drilled to 15,000 feet and deeper (by depth brackets)
1966 - 1974

	1966	1967	1968	1969	1970	1971	1972	1973	1974	Total
15,000—15,999	145	132	147	132	130	120	187	145	135	1,273
16,000—16,999	107	92	75	78	94	93	135	99	89	862
17,000—17,999	52	59	59	43	48	52	74	75	56	518
18,000—18,999	25	32	30	21	42	33	23	32	43	281
19,000—19,999	13	17	16	15	17	21	20	22	21	162
20,000—20,999	10	13	17	26	23	14	15	18	24	160
21,000—21,999	16	14	14	6	8	11	10	12	15	106
22,000—22,999	8	7	10	12	17	24	16	18	14	126
23,000—23,999	3	1	2	1	1	3	2	3	2	18
24,000—24,999				1	1		2	2	2	8
25,000—25,999					1			1	1	3
26,000—26,999									1	1
27,000—27,999									1	1
28,000—28,999							1			1
29,000—29,999										
30,000—30,999							1			1
31,000—31,999									1	1
Total	379	367	370	335	382	371	486	427	405	3,522

(Source 16)

Forecast of new U.S. wells and footage to be drilled in 1975

STATE or DISTRICT	TOTAL NEW WELLS 1975 forecast	1974 actual	% diff.	FOOTAGE (NEW WELLS) 1975 forecast	1974 actual	% diff.
Alabama	115	98	+ 17.3	1,155,750	985,838	+ 17.2
Alaska	64	27	+137.0	620,800	262,311	+136.7
Arkansas	346	317	+ 9.1	1,920,300	1,760,453	+ 9.1
California	2,238	2,129	+ 5.1	6,266,100	5,985,534	+ 4.7
Colorado	946	939	+ 0.7	5,959,800	5,897,815	+ 1.1
Florida	54	52	+ 3.8	664,200	639,375	+ 3.9
Illinois	639	598	+ 6.9	1,649,125	1,541,239	+ 6.9
Indiana	324	315	+ 2.9	550,800	539,571	+ 2.1
Kansas	3,192	3,079	+ 3.7	8,778,000	8,529,139	+ 2.9
Kentucky	702	646	+ 8.7	1,140,750	1,051,735	+ 8.5
Louisiana	4,507	4,172	+ 8.0	25,928,450	24,163,629	+ 7.3
North Louisiana	1,442	1,285	+ 12.2	5,623,800	5,035,039	+ 11.7
South Louisiana	2,243	2,115	+ 6.1	12,125,750	11,451,241	+ 5.9
Off-shore Louisiana	822	772	+ 6.5	8,178,900	7,677,349	+ 6.5
Michigan	502	408	+ 23.0	2,484,900	2,018,854	+ 23.1
Mississippi	491	446	+ 10.1	3,932,175	3,572,554	+ 10.1
Montana	802	723	+ 10.9	2,365,900	2,119,228	+ 11.6
Nebraska	231	228	+ 1.3	1,201,200	1,182,709	+ 1.6
New Mexico	1,285	1,191	+ 7.9	7,322,700	6,811,978	+ 7.5
Southeast New Mexico	786	736	+ 6.8	5,226,900	4,906,915	+ 6.5
Northwest New Mexico	499	455	+ 9.7	2,095,800	1,905,063	+ 10.0
New York	389	348	+ 11.8	797,450	707,628	+ 12.7
North Dakota	165	155	+ 6.5	1,130,250	1,058,887	+ 6.7
Ohio	1,657	1,637	+ 1.2	6,959,400	6,905,802	+ 0.8
Oklahoma	3,282	3,137	+ 4.6	18,051,000	17,291,165	+ 4.4
Pennsylvania	1,467	1,423	+ 10.9	3,080,700	2,802,069	+ 9.9
South Dakota	13	6	+116.6	68,900	31,865	+116.2
Tennessee	216	186	+ 16.1	356,400	304,203	+ 17.2
Texas	11,028	10,193	+ 8.2	58,711,850	54,184,732	+ 8.4
Districts—						
1 South Central	698	624	+ 11.9	2,617,500	2,329,388	+ 12.4
2 Middle Gulf	789	711	+ 11.0	4,655,100	4,208,212	+ 10.6
3 Upper Gulf	1,063	986	+ 7.8	6,962,650	6,444,820	+ 8.0
4 Lower Gulf S.W.	938	891	+ 5.3	5,932,850	5,634,979	+ 5.3
Offshore	175	155	+ 12.9	1,706,250	1,509,614	+ 13.0
5 East Central	195	159	+ 22.6	1,155,375	941,455	+ 22.7
6 Northeast	334	300	+ 11.3	2,421,500	2,169,907	+ 11.6
7-B North Central	1,591	1,480	+ 7.5	5,250,300	4,872,390	+ 7.8
7-C West Central	1,101	982	+ 12.1	6,468,375	5,760,570	+ 12.3
8 West	2,346	2,243	+ 4.6	11,858,200	11,327,188	+ 4.7
9 North	1,225	1,144	+ 7.1	3,858,750	3,612,976	+ 6.7
10 Panhandle	573	518	+ 10.6	3,724,500	3,368,203	+ 10.6
Utah	210	212	− 0.9	1,722,000	1,741,506	− 1.1
West Virginia	907	824	+ 10.1	2,902,400	2,646,606	+ 9.7
Wyoming	1,189	1,041	+ 14.2	8,114,925	7,103,414	+ 14.2
Other States	53	50	+ 6.0	250,425	236,195	+ 6.0
Total U.S.	35,944	33,470	+ 7.4	174,083,250	162,076,636	+ 7.4

OIL AND GAS
UNITED STATES RESERVES

(Source 16)

	Proved Reserves as of December 31		
	1972	1973	Change 1973 Vs. 1972
	Thousands of Barrels of 42 Gallons		
Crude oil	36,339,408	35,299,839	− 1,039,569
Natural gas liquids	6,786,559	6,454,707	− 331,852
Total liquid hydrocarbons	43,135,967	41,754,546	− 1,371,421
	Millions of Cubic Feet		
Natural gas	266,084,846	249,950,207	−16,134,639

Estimated total proved reserves of natural gas liquids in the United States

(Thousands of barrels of 42 U.S. gallons)
(Source: American Petroleum Institute—American Gas Association Joint Report, Vol. 28, June 1974)

		Reserves as of December 31, 1973			
State	Reserves as of 12-31-72	Non-Associated	Associated-Dissolved	Total Natural Gas Liquids	Percent Change
Alabama	27,606	43,408	1,184	44,592	+ 62
Alaska	442	0	343	343	− 22
Arkansas	7,778	3,364	1,680	5,044	− 35
California*	126,736	3,195	102,768	105,963	− 16
San Joaquin Basin	67,174	1,007	59,163	60,170	− 10
Coastal Region*	29,668	2,188	23,028	25,216	− 15
Los Angeles Basin*	29,884	0	20,577	20,577	− 31
Colorado	16,079	10,534	10,319	20,853	+ 30
Florida	8,800	0	3,307	3,307	+ 62
Illinois	814	0	0	0	−100
Indiana	14	0	0	0	−100
Kansas	393,082	378,555	8,743	387,298	− 2
Kentucky	46,782	45,324	0	45,324	− 3
Louisiana*	2,135,837	1,672,350	320,187	1,992,537	− 7
North	107,282	44,610	42,214	86,824	− 19
South*	2,028,555	1,627,740	277,973	1,905,713	− 6
Michigan	19,026	7,507	17,539	25,046	+ 32
Mississippi	14,620	7,495	6,595	14,090	− 4
Montana	4,413	694	2,931	3,625	− 18
Nebraska	1,630	511	781	1,292	− 21
New Mexico	502,787	294,227	118,953	413,180	− 18
Northwest	270,913	254,408	1,090	255,498	− 6
South*	231,874	39,819	117,863	157,682	− 32
North Dakota	45,367	79	53,266	53,345	+ 18
Ohio	0	0	0	0	0
Oklahoma	335,161	189,714	99,388	289,102	− 14
Pennsylvania	735	659	0	659	− 10
Texas*	2,891,583	1,341,127	1,489,016	2,830,143	− 2
District 1	16,742	21,180	5,330	26,510	+ 58
District 2	122,029	98,095	46,223	144,318	+ 18
District 3*	570,324	228,432	236,362	464,794	− 18
District 4*	424,019	333,455	157,106	490,561	+ 16
District 5	73,358	61,572	11,689	73,261	− 0.1
District 6	384,345	101,953	253,736	355,689	− 8
District 7B	52,921	6,141	56,020	62,161	+ 18
District 7C	118,506	46,206	74,402	120,608	+ 2
District 8	475,338	138,669	315,049	453,718	− 4
District 8A	258,147	734	263,997	264,731	+ 3
District 9	68,280	30,059	48,403	78,462	+ 15
District 10	327,574	274,631	20,699	295,330	− 10
Utah	34,002	472	52,072	52,544	+ 54
West Virginia	82,084	82,755	0	82,755	+ 0.8
Wyoming	91,191	42,061	41,604	83,665	− 8
Total United States	6,786,559	4,124,031	2,330,676	6,454,707	− 4.9

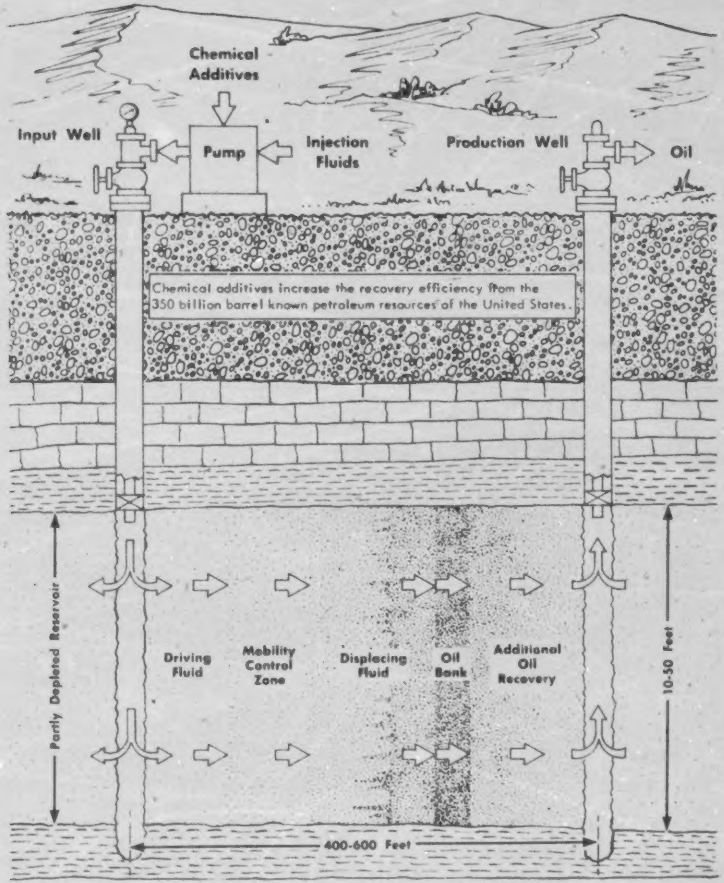
* Includes offshore reserves.

The remaining proved natural gas liquids reserves in the Gulf of Mexico are estimated to be 854,253,000 barrels; of which 749,933,000 barrels are Non-Associated and 104,320,000 barrels are Associated-Dissolved.

ENHANCED RECOVERY

(Source 26)

IMPROVING SECONDARY AND TERTIARY METHODS OF PETROLEUM RECOVERY

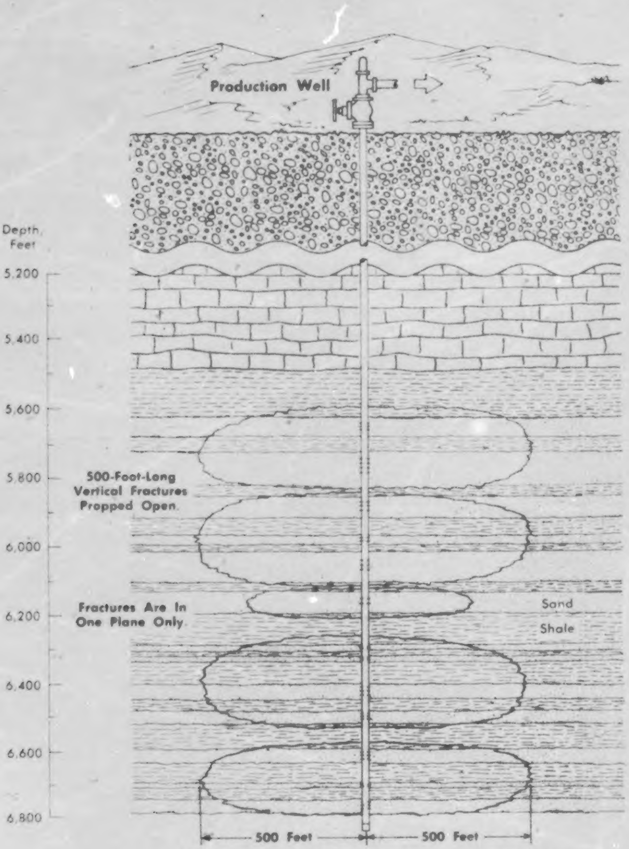

Chemical Additives
Input Well
Pump
Injection Fluids
Production Well
Oil
Partly Depleted Reservoir
Driving Fluid
Mobility Control Zone
Displacing Fluid
Oil Bank
Additional Oil Recovery
10-50 Feet
400-600 Feet

Chemical additives increase the recovery efficiency from the 350 billion barrel known petroleum resources of the United States.

In miscible-fluid waterflooding, a slug of micellar solution is moved through the reservoir by water to displace oil.

(Source 26)

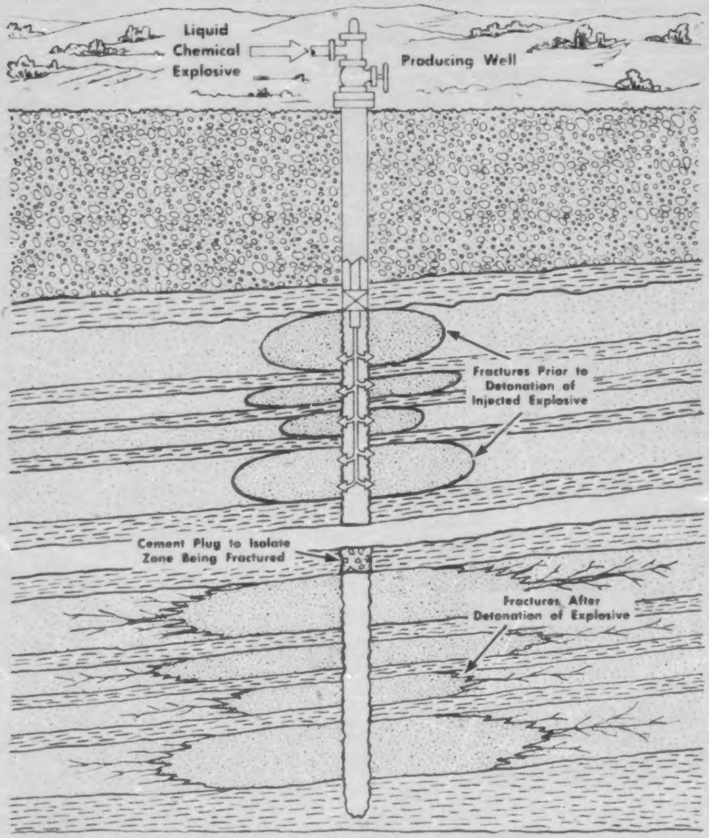
PRODUCTION STIMULATION BY MASSIVE HYDRAULIC FRACTURING


Production Well
Depth, Feet
5,200
5,400
5,600
5,800
6,000
6,200
6,400
6,600
6,800
500-Foot-Long Vertical Fractures Propped Open.
Fractures Are In One Plane Only.
Sand
Shale
500 Feet
500 Feet

Multistage Massive Hydraulic Fracturing Concept.

(Source 26)

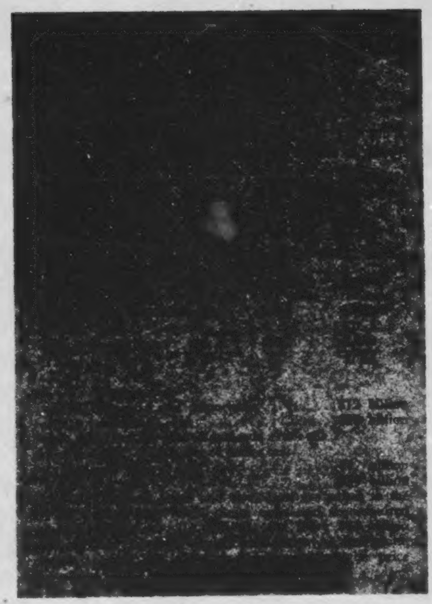
CHEMICAL EXPLOSIVE FRACTURING


Liquid Chemical Explosive
Producing Well
Fractures Prior to Detonation of Injected Explosive
Cement Plug to Isolate Zone Being Fractured
Fractures After Detonation of Explosive

The injection and detonation of liquid chemical explosive increase production of petroleum from tight formations.

PRICES

(Source 16)



(379)

DRILLING STATISTICS

53-136 O - 75 - 26

(Source 11)

Exploratory Drilling in Canada 1974
By Classes and Types of Completion

[illegible]

Canadian Committee on Statistics of Drilling

(383)

(Source 11)

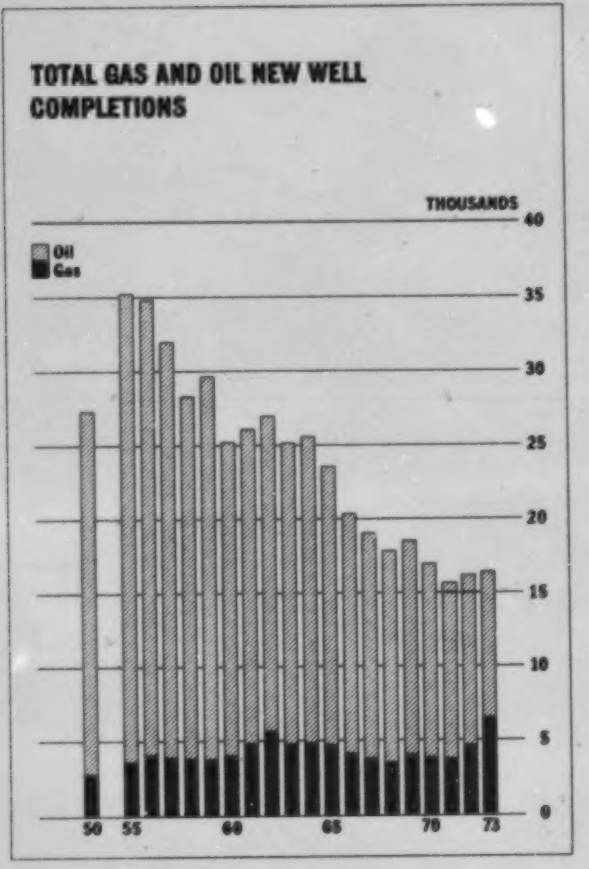
Exploratory Drilling in Mexico 1974

DISTRICT	CLASSIFICATION	NUMBER	[illegible]
[illegible]	NEW FIELD WILDCATS	[illegible]	[illegible]
	NEW POOL WILDCATS	[illegible]	[illegible]
	DEEPER POOL WILDCATS	[illegible]	[illegible]
	SHALLOWER POOL WILDCATS	[illegible]	[illegible]
	STRATIGRAPHIC TESTS	[illegible]	[illegible]
	TOTAL	[illegible]	[illegible]
TAMPICO-TUXPAN BASIN	NEW FIELD WILDCATS	[illegible]	[illegible]
	STRATIGRAPHIC TESTS	[illegible]	[illegible]
	TOTAL	[illegible]	[illegible]
POZA RICA DISTRICT AND VERACRUZ EMBAYMENT	NEW FIELD WILDCATS	[illegible]	[illegible]
	NEW POOL WILDCATS	[illegible]	[illegible]
	DEEPER POOL WILDCATS	[illegible]	[illegible]
	SHALLOWER POOL WILDCATS	[illegible]	[illegible]
	STRATIGRAPHIC TESTS	[illegible]	[illegible]
	TOTAL	[illegible]	[illegible]
[illegible]	NEW FIELD WILDCATS	[illegible]	[illegible]
	NEW POOL WILDCATS	[illegible]	[illegible]
	DEEPER POOL WILDCATS	[illegible]	[illegible]
	SHALLOWER POOL WILDCATS	[illegible]	[illegible]
	STRATIGRAPHIC TESTS	[illegible]	[illegible]
	TOTAL	[illegible]	[illegible]
EXPLORATORY WELLS [illegible]	GRAND TOTAL	[illegible]	[illegible]

TOTAL WELLS DRILLED EXPLORATION AND DEVELOPMENT	[illegible]
TOTAL FOOTAGE DRILLED, EXPLORATION & DEVELOPMENT	[illegible]
AVERAGE DEPTH FOR TOTAL WELLS	[illegible]
EXPLORATORY WELLS	[illegible]
EXPLORATORY FOOTAGE DRILLED	[illegible]
AVERAGE DEPTH OF EXPLORATORY WELL	[illegible]
WELLS ABANDONED DUE TO MECHANICAL PROBLEMS [illegible]	[illegible]
EXPLORATORY WELLS [illegible]	[illegible]
EXPLORATORY PERCENT SUCCESS	[illegible]

Petroleos Mexicanos

(Source 9)


TOTAL GAS AND OIL NEW WELL COMPLETIONS
THOUSANDS
Oil
Gas
40
35
30
25
20
15
10
5
0
50
55
60
65
70
73

(Source 2)

TOTAL WELLS DRILLED IN THE UNITED STATES[1]

1974

State or District	Oil Wells[2]		Gas Wells[3]		Dry Holes	
	Wells	Footage	Wells	Footage	Wells	Footage
Alabama	16	156,875	16	119,620	66	626,556
Alaska – Onshore	16	122,014	4	11,180	7	67,288
Alaska – Offshore	11	74,880	—	—	—	
Alaska – Total	27	196,894	4	11,180	7	67,288
Arizona	3	16,004	—	—	8	57,058
Arkansas	99	534,450	41	190,782	177	963,751
California – North	2	3,959	60	319,301	122	720,751
California – Central Coastal	213	745,981	—	—	55	275,940
California – East Central	1,220	1,975,951	8	30,657	111	530,685
California – South	79	228,788	—	—	16	87,948
California – Offshore	53	162,732	1	2,255	10	30,384
California – Total	1,567	3,117,411	69	352,213	314	1,645,708
Colorado	218	1,315,361	201	1,415,025	417	2,331,513
Florida	9	122,092	—	—	36	419,593
Georgia	—	—	—	—	5	29,755
Idaho	—	—	—	—	2	8,522
Illinois	357	870,144	11	22,651	427	1,099,217
Indiana	136	215,643	21	22,653	219	339,882
Iowa	—	—	—	—	2	3,395
Kansas	989	2,473,604	389	1,133,111	1,312	4,329,554
Kentucky	195	239,141	127	269,779	336	508,336
Louisiana – North	326	915,463	458	1,565,420	387	2,036,733
Louisiana – South	283	2,315,650	190	2,260,796	465	4,917,170
Louisiana – Offshore	216	2,027,092	141	1,568,413	304	2,690,658
Louisiana – Total	825	5,258,205	789	5,394,629	1,156	9,644,561
Maryland	—	—	1	5,120	1	8,119
Michigan	116	605,950	52	284,306	234	1,126,678
Mississippi	67	587,658	26	111,141	349	2,817,916
Missouri[4]	7	768	2	770	23	41,786
Montana	80	272,209	145	269,672	467	1,498,967
Nebraska	40	199,246	5	25,709	185	964,197
Nevada	—	—		—	2	18,020
New Mexico – East	297	1,351,146	211	1,922,110	252	1,452,126
New Mexico – West	53	247,473	252	1,145,643	63	249,104
New Mexico – Total	350	1,598,619	463	3,067,753	315	1,701,230
New York	153	186,871	98	287,246	41	154,674
North Carolina	—	—	—	—	11	43,799
North Dakota	42	340,398	—	—	85	607,315
Ohio	567	2,257,315	1,050	4,441,362	171	660,942
Oklahoma	1,149	5,481,703	744	4,869,781	1,164	6,369,870
Pennsylvania	671	728,889	468	1,641,224	69	258,514
South Dakota	1	9,086	—	—	10	53,846
Tennessee	61	90,029	12	18,251	62	106,597
Texas RRC Dist. 1	252	702,113	96	503,419	207	876,662
Texas RRC Dist. 2	77	464,145	290	1,678,902	312	1,859,721
Texas RRC Dist. 3	369	1,764,712	162	1,253,239	412	3,007,483
Texas RRC Dist. 4	230	1,298,075	326	2,261,133	320	1,997,941
Texas RRC Dist. 5	33	134,659	15	144,395	90	497,368
Texas RRC Dist. 6	88	400,218	71	649,611	135	1,020,835
Texas RRC Dist. 7B	444	1,343,016	183	754,019	542	1,728,656
Texas RRC Dist. 7C	414	2,194,060	282	1,846,123	225	1,118,788
Texas RRC Dist. 8	1,058	5,465,121	127	1,528,784	164	1,369,546
Texas RRC Dist. 8A	619	3,216,872	25	111,803	193	1,176,382
Texas RRC Dist. 9	626	1,461,849	100	592,837	401	1,449,475
Texas RRC Dist. 10	191	821,503	145	1,394,567	142	958,738
Texas – Offshore	1	8,886	21	166,919	141	1,156,921
Texas – Total	4,402	19,279,229	1,843	12,685,751	3,284	18,218,516
Utah	118	1,181,851	12	95,686	65	339,294
Virginia	—	—	55	266,809	6	31,074
West Virginia	121	290,716	556	1,669,358	102	359,864
Wyoming	418	2,582,625	40	314,900	530	3,794,677
Gulf of Mexico – Northern[4]	—	—	—	—	14	105,357
Total – 1974	12,784	50,208,984	7,340	38,986,482	11,674	61,355,941

---

[1] Does not include miscellaneous drilling not related to oil and gas exploration and production.

[2] Includes multiple completion wells which produce gas from one or more zones but oil from at least one zone. (See Tables IV-A and IV-B for detail on multiple completion wells.) A multiple completion well is counted as one well.

cont. on page ______

TOTAL WELLS DRILLED IN THE UNITED STATES[1]

1974

Total Wells Excluding Service Wells, Stratigraphic & Core Tests		Stratigraphic and Core Tests		Service Wells		Total Wells All Types 1974		
Wells	Footage	Wells	Footage	Wells	Footage	Wells	Footage	State or District
98	903,051	–	–	–	–	98	903,051	Alabama
27	200,482	–	–	–	–	27	200,482	Alaska – Onshore
11	74,880					11	74,880	Alaska – Offshore
38	275,362	–	–	–	–	38	275,362	Alaska – Total
11	73,062	–	–	–	–	11	73,062	Arizona
317	1,688,983	–	–	3	12,898	320	1,701,881	Arkansas
184	1,044,011	–	–	9	50,430	193	1,094,441	California – North
268	1,021,921	–	–	17	50,761	285	1,072,682	California – Central Coastal
1,339	2,537,293	–	–	130	148,666	1,469	2,685,959	California – East Central
95	316,736	–	–	40	97,262	135	413,998	California – South
64	195,371	–	–	7	23,039	71	218,410	California – Offshore
1,950	5,115,332			203	370,158	2,153	5,485,490	California – Total
836	5,061,899	–	–	7	43,917	843	5,105,816	Colorado
45	541,685	–	–	3	33,849	48	575,534	Florida
5	29,755	–	–	–	–	5	29,755	Georgia
2	8,522	–	–	–	–	2	8,522	Idaho
795	1,992,012		–	28	38,969	823	2,030,981	Illinois
376	578,176		–	14	24,533	390	602,709	Indiana
2	3,395		–	–		2	3,395	Iowa
2690	7,936,269	17	22,325	98	153,343	2,825	8,111,937	Kansas
658	1,017,256	1	2,036	38	47,224	697	1,066,516	Kentucky
1,171	4,517,616		–	38	29,304	1,209	4,546,920	Louisiana – North
938	9,493,616		–	3	25,732	941	9,519,348	Louisiana – South
661	6,286,163	–	–	19	156,368	680	6,442,531	Louisiana – Offshore
2,770	20,297,395		–	60	211,404	2,830	20,508,799	Louisiana – Total
2	13,239		–	–	–	2	13,239	Maryland
402	2,016,934			12	38,634	414	2,055,568	Michigan
442	3,516,715	–	–	8	45,680	450	3,562,395	Mississippi
32	43,324	69	6,788		–	101	50,112	Missouri
672	2,040,848	1	2,893	–	–	673	2,043,741	Montana
230	1,189,152	–	–	–	–	230	1,189,152	Nebraska
2	18,020	–	–	–	–	2	18,020	Nevada
760	4,725,382	–	–	13	62,042	773	4,787,424	New Mexico – East
368	1,642,220			1	440	369	1,642,660	New Mexico – West
1,128	6,367,602		–	14	62,482	1,142	6,430,084	New Mexico – Total
292	628,791	–	–	56	76,473	348	705,264	New York
11	43,799	–		–		11	43,799	North Carolina
127	947,713	–	–	1	7,935	128	955,648	North Dakota
1,788	7,359,619	1	210	1	4,302	1,790	7,364,131	Ohio
3,057	16,721,354	1	768	131	324,256	3,189	17,046,378	Oklahoma
1,208	2,628,627	8	11,123	106	180,715	1,322	2,820,465	Pennsylvania
11	62,932		–	–	–	11	62,932	South Dakota
135	214,877	–	–	–	–	135	214,877	Tennessee
555	2,082,194	–	–	7	18,009	562	2,100,203	Texas RRC Dist. 1
679	4,002,768	–	–	3	15,436	682	4,018,204	Texas RRC Dist. 2
943	6,025,434	–	–	3	1,811	946	6,027,245	Texas RRC Dist. 3
876	5,557,149	–		1	4,308	877	5,561,457	Texas RRC Dist. 4
138	776,422		–	8	14,726	146	791,148	Texas RRC Dist. 5
294	2,070,664		–	17	37,845	311	2,108,509	Texas RRC Dist. 6
1,169	3,825,691		–	45	95,638	1,214	3,921,329	Texas RRC Dist. 7B
921	5,158,971	18	27,318	4	15,300	943	5,201,589	Texas RRC Dist. 7C
1,349	8,363,451	1	5,280	43	170,050	1,393	8,538,781	Texas RRC Dist. 8
837	4,505,057		–	97	358,242	934	4,863,299	Texas RRC Dist. 8A
1,127	3,506,161	–	–	32	62,119	1,159	3,568,280	Texas RRC Dist. 9
478	2,976,808	–	–		–	478	2,976,808	Texas RRC Dist. 10
163	1,332,726		–		–	163	1,332,726	Texas – Offshore
9,529	50,183,496	19	32,598	260	793,484	9,808	51,009,578	Texas – Total
195	1,616,831		–	1	5,869	196	1,622,700	Utah
61	297,883	–	–	–		61	297,883	Virginia
779	2,319,938	–	–	1	5,130	780	2,325,068	West Virginia
988	6,692,202	–	–	13	52,788	1,001	6,744,990	Wyoming
14	105,357	–	–	–	–	14	105,357	Gulf of Mexico – Northern[4]
31,698	150,551,407	137	78,741	1,058	2,534,043	32,893	153,164,191	**Total – 1974**

---

[1] Includes multiple completion wells which produce gas from all zones. (See Tables IV-A and IV-B for detail on multiple completion wells.) A multiple completion well is counted as one well. Gas wells also include so-called condensate wells.

[4] See footnote 4, page 3.

(Source 2)

TOTAL EXPLORATORY WELLS DRILLED IN THE UNITED STATES
1974

State or District	Oil Wells[1]		Gas Wells[2]		Dry Holes		Total Exploratory Wells	
	Wells	Footage	Wells	Footage	Wells	Footage	Wells	Footage
Alabama	5	66,516	4	10,410	49	465,207	58	542,133
Alaska – Onshore	2	18,930	3	8,830	7	67,288	12	95,048
Alaska – Offshore	–	–	–	–	–	–	–	–
Alaska – Total	2	18,930	3	8,830	7	67,288	12	95,048
Arizona	–	–	–	–	5	38,939	5	38,939
Arkansas	8	60,358	2	11,024	80	479,864	90	551,246
California – North	–	–	16	81,121	77	462,349	93	543,470
California – Central Coastal	11	64,686	–	–	41	223,795	52	288,481
California – East Central	12	69,844	–	–	62	369,669	74	439,513
California – South	3	6,793	–	–	7	45,880	10	52,673
California – Offshore	2	5,792	–	–	4	25,399	6	31,191
California – Total	28	147,115	16	81,121	191	1,127,092	235	1,355,328
Colorado	25	152,056	26	168,544	287	1,621,847	338	1,942,447
Florida	2	23,281	–	–	28	296,705	30	319,986
Georgia	–	–	–	–	5	29,755	5	29,755
Idaho	–	–	–	–	2	8,522	2	8,522
Illinois	25	65,089	3	5,351	192	505,926	220	576,366
Indiana	18	39,493	6	8,390	144	216,125	168	264,008
Iowa	–	–	–	–	2	3,395	2	3,395
Kansas	98	390,458	33	115,096	716	2,402,565	847	2,908,119
Kentucky	24	32,096	20	44,040	140	235,443	184	311,579
Louisiana – North	8	65,839	22	152,499	189	1,159,365	219	1,377,703
Louisiana – South	15	179,778	38	543,339	223	2,706,953	276	3,430,070
Louisiana – Offshore	1	8,162	1	16,181	149	1,179,830	151	1,204,173
Louisiana – Total	24	253,779	61	712,019	561	5,046,148	646	6,011,946
Maryland	–	–	1	5,120	1	8,119	2	13,239
Michigan	50	272,933	34	192,189	174	826,993	258	1,292,115
Mississippi	23	228,641	6	49,773	263	2,203,944	292	2,482,358
Missouri	–	–	1	360	23	41,786	24	42,146
Montana	10	71,184	35	67,571	336	1,171,884	381	1,310,639
Nebraska	13	67,088	3	14,720	139	712,058	155	793,866
Nevada	–	–	–	–	2	18,020	2	18,020
New Mexico – East	6	54,544	46	402,851	116	588,716	168	1,046,111
New Mexico – West	2	11,694	2	8,729	37	152,377	41	172,800
New Mexico – Total	8	66,238	48	411,580	153	741,093	209	1,218,911
New York	–	–	19	67,113	30	123,499	49	190,612
North Carolina		–	–	–	11	43,799	11	43,799
North Dakota	11	75,996	–	–	63	447,162	74	523,158
Ohio	20	105,369	117	507,792	35	166,632	172	779,793
Oklahoma	51	356,126	61	540,727	284	1,777,911	396	2,674,764
Pennsylvania	11	14,851	42	168,573	48	221,999	101	405,423
South Dakota	–	–	–	–	9	46,332	9	46,332
Tennessee	17	25,105	11	16,676	57	98,702	85	140,483
Texas RRC Dist. 1	10	41,609	29	154,207	149	675,744	188	871,560
Texas RRC Dist. 2	21	137,480	142	882,455	213	1,352,621	376	2,372,556
Texas RRC Dist. 3	36	327,349	104	877,073	286	2,393,026	426	3,597,448
Texas RRC Dist. 4	24	151,593	86	618,004	197	1,307,731	307	2,077,328
Texas RRC Dist. 5	3	27,698	9	84,790	68	439,928	80	552,416
Texas RRC Dist. 6	5	44,124	16	153,955	101	779,552	122	977,631
Texas RRC Dist. 7B	29	118,966	44	173,949	288	1,102,936	361	1,395,851
Texas RRC Dist. 7C	28	153,201	25	138,041	142	712,861	195	1,006,103
Texas RRC Dist. 8	37	284,064	31	394,973	89	768,871	157	1,447,908
Texas RRC Dist. 8A	23	172,477	–	–	119	782,431	142	954,908
Texas RRC Dist. 9	56	266,045	48	272,221	213	985,131	317	1,523,397
Texas RRC Dist. 10	6	65,086	16	169,963	64	534,929	86	769,978
Texas – Offshore	–	–	12	89,774	138	1,131,494	150	1,221,268
Texas – Total	278	1,789,692	562	4,009,405	2,067	12,967,255	2,907	18,766,352
Utah	4	48,696	4	35,660	48	283,355	56	367,711
Virginia	–	–	5	26,053	3	17,532	8	43,585
West Virginia	5	12,651	53	207,262	44	179,366	102	399,279
Wyoming	54	468,518	19	188,264	397	2,988,203	470	3,644,985
Gulf of Mexico – Northern[3]	–	–	–	–	14	105,357	14	105,357
Total – 1974	814	4,852,259	1,195	7,673,663	6,610	37,735,822	8,619	50,261,744

---

[1] Includes multiple completion wells which produce gas from one or more zones but oil from at least one zone. (See Table IV-A for detail on multiple completion wells.)

[2] Includes multiple completion wells which produce gas from all zones. (See Table IV-A for detail on multiple completion wells.) Gas wells also include so-called condensate wells.

[3] See footnote 4, page 3.

(Source 2)

DEVELOPMENT WELLS DRILLED IN THE UNITED STATES
1974

State or District	Oil Wells[1] Wells	Oil Wells[1] Footage	Gas Wells[2] Wells	Gas Wells[2] Footage	Dry Holes Wells	Dry Holes Footage	Total Development Wells Wells	Total Development Wells Footage
Alabama	11	90,359	12	109,210	17	161,349	40	360,918
Alaska – Onshore	14	103,084	1	2,350		—	15	105,434
Alaska – Offshore	11	74,880	—	—	—	—	11	74,880
Alaska – Total	25	177,964	1	2,350	—	—	26	180,314
Arizona	3	16,004	—	—	3	18,119	6	34,123
Arkansas	91	474,092	39	179,758	97	483,887	227	1,137,737
California – North	2	3,959	44	238,180	45	258,402	91	500,541
California – Central Coastal	202	681,295	—		14	52,145	216	733,440
California – East Central	1,208	1,906,107	8	30,657	49	161,016	1,265	2,097,780
California – South	76	221,995		—	9	42,068	85	264,063
California – Offshore	51	156,940	1	2,255	6	4,985	58	164,180
California – Total	1,539	2,970,296	53	271,092	123	518,616	1,715	3,760,004
Colorado	193	1,163,305	175	1,246,481	130	709,666	498	3,119,452
Florida	7	98,811	—	—	8	122,888	15	221,699
Georgia	—	—	—		—	—	—	—
Idaho		—	—	—	—	—	—	—
Illinois	332	805,055	8	17,300	235	593,291	575	1,415,646
Indiana	118	176,148	15	14,263	75	123,757	208	314,168
Iowa		—	—	—	—	—	—	—
Kansas	891	2,083,146	356	1,018,015	596	1,926,989	1,843	5,028,150
Kentucky	171	207,045	107	225,739	196	272,893	474	705,677
Louisiana – North	318	849,624	436	1,412,921	198	877,368	952	3,139,913
Louisiana – South	268	2,135,872	152	1,717,457	242	2,210,217	662	6,063,546
Louisiana – Offshore	215	2,018,930	140	1,552,232	155	1,510,828	510	5,081,990
Louisiana – Total	801	5,004,426	728	4,682,610	595	4,598,413	2,124	14,285,449
Maryland					—	—	—	—
Michigan	66	333,017	18	92,117	60	299,685	144	724,819
Mississippi	44	359,017	20	61,368	86	613,972	150	1,034,357
Missouri	7	768	1	410		—	8	1,178
Montana	50	201,025	110	202,101	131	327,083	291	730,209
Nebraska	27	132,158	2	10,989	46	252,139	75	395,286
Nevada	—		—		—		—	—
New Mexico – East	291	1,296,602	165	1,519,259	136	863,410	592	3,679,271
New Mexico – West	51	235,779	250	1,136,914	26	96,727	327	1,469,420
New Mexico – Total	342	1,532,381	415	2,656,173	162	960,137	919	5,148,691
New York	153	186,871	79	220,133	11	31,175	243	438,179
North Carolina		—	—		—	—	—	—
North Dakota	31	264,402	—	—	22	160,153	53	424,555
Ohio	547	2,151,946	933	3,933,570	136	494,310	1,616	6,579,826
Oklahoma	1,098	5,125,577	683	4,329,054	880	4,591,959	2,661	14,046,590
Pennsylvania	660	714,038	426	1,472,651	21	36,515	1,107	2,223,204
South Dakota	1	9,086	—		1	7,514	2	16,600
Tennessee	44	64,924	1	1,575	5	7,895	50	74,394
Texas RRC Dist. 1	242	660,504	67	349,212	58	200,918	367	1,210,634
Texas RRC Dist. 2	56	326,665	148	796,447	99	507,100	303	1,630,212
Texas RRC Dist. 3	333	1,437,363	58	376,166	126	614,457	517	2,427,986
Texas RRC Dist. 4	206	1,146,482	240	1,643,129	123	690,210	569	3,479,821
Texas RRC Dist. 5	30	106,961	6	59,605	22	57,440	58	224,006
Texas RRC Dist. 6	83	356,094	55	495,656	34	241,283	172	1,093,033
Texas RRC Dist. 7B	415	1,224,050	139	580,070	254	625,720	808	2,429,840
Texas RRC Dist. 7C	386	2,040,859	257	1,708,082	83	405,927	726	4,154,868
Texas RRC Dist. 8	1,021	5,181,057	96	1,133,811	75	600,675	1,192	6,915,543
Texas RRC Dist. 8A	596	3,044,395	25	111,803	74	393,951	695	3,550,149
Texas RRC Dist. 9	570	1,197,804	52	320,616	188	464,344	810	1,982,764
Texas RRC Dist. 10	185	758,417	129	1,024,604	78	423,809	392	2,206,830
Texas – Offshore	1	8,886	9	77,145	3	25,427	13	111,458
Texas – Total	4,124	17,489,537	1,281	8,676,346	1,217	5,251,261	6,622	31,417,144
Utah	114	1,133,155	8	60,026	17	55,939	139	1,249,120
Virginia			50	240,756	3	13,542	53	254,298
West Virginia	116	278,065	503	1,462,096	58	180,498	677	1,920,659
Wyoming	364	2,114,107	21	126,636	133	806,474	518	3,047,217
Gulf of Mexico – Northern[3]	—	—	—	—	—	—	—	—
Total – 1974	11,970	45,356,725	6,045	31,312,819	5,064	23,620,119	23,079	100,289,663

---

[1] Includes multiple completion wells which produce gas from one or more zones but oil from at least one zone. (See Table IV B for detail on multiple completion wells.)

[2] Includes multiple completion wells which produce gas from all zones. (See Table IV B for detail on multiple completion wells.) Gas wells also include so-called condensate wells.

[3] See footnote 4, page 3.

(Source 2)

NEW-FIELD WILDCAT WELLS DRILLED IN THE UNITED STATES
1974

State or District	Oil Wells[1] Wells	Oil Wells[1] Footage	Gas Wells[2] Wells	Gas Wells[2] Footage	Total Producing Wells Wells	Total Producing Wells Footage	Dry Holes Wells	Dry Holes Footage	Total New-Field Wildcat Wells Wells	Total New-Field Wildcat Wells Footage
Alabama	–	–	3	7,946	3	7,946	44	443,555	47	451,501
Alaska – Onshore	–	–	–	–	–	–	7	67,288	7	67,288
Alaska – Offshore	–	–	–	–	–	–	–	–	–	–
Alaska – Total	–	–	–	–	–	–	7	67,288	7	67,288
Arizona	–	–	–	–	–	–	5	38,939	5	38,939
Arkansas	6	48,814	2	11,024	8	59,838	80	479,864	88	539,702
California – North	–	–	5	28,508	5	28,508	32	210,003	37	238,511
California – Central Coastal	–	–	–	–	–	–	18	112,447	18	112,447
California – East Central	1	13,152	–	–	1	13,152	26	163,661	27	176,813
California – South	–	–	–	–	–	–	2	22,202	2	22,202
California – Offshore	–	–	–	–	–	–	3	18,999	3	18,999
California – Total	1	13,152	5	28,508	6	41,660	81	527,312	87	568,972
Colorado	19	117,288	14	93,959	33	211,247	263	1,497,836	296	1,709,083
Florida	2	23,281	–	–	2	23,281	28	296,705	30	319,986
Georgia	–	–	–	–	–	–	5	29,755	5	29,755
Idaho	–	–	–	–	–	–	2	8,522	2	8,522
Illinois	4	11,870	1	2,005	5	13,875	98	247,047	103	260,922
Indiana	3	4,191	4	6,257	7	10,448	95	117,586	102	128,034
Iowa	–	–	–	–	–	–	2	3,395	2	3,395
Kansas	17	72,197	6	12,641	23	84,838	262	775,299	285	860,137
Kentucky	2	5,434	5	10,079	7	15,513	86	130,964	93	146,477
Louisiana – North	8	65,839	15	96,928	23	162,767	169	977,373	192	1,140,140
Louisiana – South	4	43,230	12	200,201	16	243,431	106	1,246,709	122	1,490,140
Louisiana – Offshore	1	8,162	1	16,181	2	24,343	149	1,179,830	151	1,204,173
Louisiana – Total	13	117,231	28	313,310	41	430,541	424	3,403,912	465	3,834,453
Maryland	–	–	1	5,120	1	5,120	–	–	1	5,120
Michigan	48	262,498	34	192,189	82	454,687	169	803,866	251	1,258,553
Mississippi	13	116,552	4	39,766	17	156,318	241	2,017,820	258	2,174,138
Missouri	–	–	1	360	1	360	23	41,786	24	42,146
Montana	6	54,299	21	42,559	27	96,858	289	1,065,299	316	1,162,157
Nebraska	10	52,788	3	14,720	13	67,508	132	669,734	145	737,242
Nevada	–	–	–	–	–	–	2	18,020	2	18,020
New Mexico – East	4	33,185	40	359,543	44	392,728	110	540,815	154	933,543
New Mexico – West	2	17,394	2	3,029	4	20,423	34	134,436	38	154,859
New Mexico – Total	6	50,579	42	362,572	48	41[illegible]	144	675,251	192	1,088,402
New York	–	–	12	43,122	12	4[illegible]	25	110,297	37	153,419
North Carolina	–	–	–	–	–	–	11	43,799	11	43,799
North Dakota	5	35,352	–	–	5	35,352	54	370,853	59	406,205
Ohio	–	–	4	13,493	4	13,493	7	38,526	11	52,019
Oklahoma	16	109,084	32	277,080	48	386,164	150	991,260	198	1,377,424
Pennsylvania	2	3,028	–	–	2	3,028	14	86,073	16	89,101
South Dakota	–	–	–	–	–	–	9	46,332	9	46,332
Tennessee	5	7,307	5	8,230	10	15,537	37	68,895	47	84,432
Texas RRC Dist. 1	2	10,775	9	57,686	11	68,461	107	449,366	118	517,827
Texas RRC Dist. 2	2	14,617	20	134,346	22	148,963	158	991,349	180	1,140,312
Texas RRC Dist. 3	4	43,442	16	158,880	20	202,322	157	1,353,717	177	1,556,039
Texas RRC Dist. 4	6	33,363	28	201,251	34	234,614	136	936,383	170	1,170,997
Texas RRC Dist. 5	3	27,698	4	11,099	7	38,797	63	434,747	70	473,544
Texas RRC Dist. 6	2	14,043	8	85,743	10	99,786	91	690,358	101	790,144
Texas RRC Dist. 7B	25	101,867	38	151,273	63	253,140	268	1,030,825	331	1,283,965
Texas RRC Dist. 7C	11	71,056	11	66,159	22	137,215	81	406,147	103	543,362
Texas RRC Dist. 8	7	42,969	6	77,027	13	119,996	57	525,685	70	645,681
Texas RRC Dist. 8A	17	127,162	–	–	17	127,162	117	779,833	134	906,995
Texas RRC Dist. 9	53	251,934	44	249,051	97	500,985	213	985,131	310	1,486,116
Texas RRC Dist. 10	6	65,086	16	169,963	22	235,049	64	534,929	86	769,978
Texas – Offshore	–	–	3	22,749	3	22,749	131	1,058,328	134	1,081,077
Texas – Total	138	803,412	203	1,395,827	341	2,199,239	1,639	10,166,798	1,980	12,366,037
Utah	2	13,433	4	35,660	6	49,093	41	244,340	47	293,433
Virginia	–	–	–	–	–	–	1	6,972	1	6,972
West Virginia	–	–	4	26,874	4	26,874	15	65,189	19	92,063
Wyoming	40	341,699	9	78,138	49	419,837	353	2,647,208	402	3,067,045
Gulf of Mexico – Northern[3]	–	–	–	–	–	–	9	58,083	9	58,083
Total – 1974	358	2,265,489	447	3,027,439	805	5,292,928	4,847	28,298,383	5,652	33,591,311

---

[1] Includes multiple completion wells which produce gas from one or more zones but oil from at least one zone. (See Table IV-A for detail on multiple completion wells.)

[2] Includes multiple completion wells which produce gas from all zones. (See Table IV-A for detail on multiple completion wells.) Gas wells also include so-called condensate wells.

[3] See footnote 4, page 1.

(Source 16)

Forecast of new U.S. producing well completions in 1975

STATE or DISTRICT	1975 forecast New oil wells	1975 forecast New gas wells	1975 forecast Total productive wells	1974 actual New oil wells	1974 actual New gas wells	1974 actual Total productive wells	% diff. total productive wells	1974 percent of U.S. New oil wells	1974 percent of U.S. New gas wells
Alabama	20	20	40	19	18	37	+ 8.1	0.1	0.3
Alaska	40	5	45	18	1	19	+136.8	0.1	
Arkansas	115	40	155	104	38	142	+ 9.2	0.8	0.5
California	1,630	80	1,710	1,547	78	1,625	+ 5.2	11.3	1.1
Colorado	250	240	490	249	240	489	+ 0.2	1.8	3.4
Florida	20		20	16		16	+ 25.0	0.1	
Illinois	295	55	350	277	53	330	+ 6.1	2.0	0.8
Indiana	105	25	130	101	25	126	+ 3.2	0.7	0.4
Kansas	1,215	435	1,650	1,172	411	1,583	+ 4.2	8.6	5.8
Kentucky	220	150	370	203	136	339	+ 9.1	1.5	1.9
Louisiana	1,120	970	2,090	1,034	891	1,925	+ 8.6	7.5	12.7
North Louisiana	375	560	935	333	499	832	+ 12.4	2.4	7.1
South Louisiana	395	235	630	371	225	596	+ 5.7	2.7	3.2
Offshore Louisiana	350	175	525	330	167	497	+ 5.6	2.4	2.4
Michigan	140	60	200	116	49	165	+ 21.2	0.9	0.7
Mississippi	80	40	120	72	35	107	+ 12.1	0.5	0.5
Montana	85	180	265	79	164	243	+ 9.1	0.6	2.3
Nebraska	35	10	45	34	7	41	+ 9.8	0.2	0.1
New Mexico	375	530	905	355	489	844	+ 7.2	2.6	7.0
Southeast New Mexico	300	210	510	284	195	479	+ 6.5	2.1	2.8
Northwest New Mexico	75	320	395	71	294	365	+ 8.2	0.5	4.2
New York	190	100	280	162	91	253	+ 10.7	1.2	1.3
North Dakota	55	10	65	50	8	58	+ 12.1	0.4	0.1
Ohio	845	675	1,520	833	666	1,499	+ 1.4	6.1	9.5
Oklahoma	1,290	760	2,050	1,233	729	1,962	+ 4.5	9.0	10.4
Pennsylvania	745	520	1,265	673	469	1,142	+ 10.8	4.9	6.7
Tennessee	100	20	120	86	15	101	+ 18.8	0.6	0.2
Texas	4,825	2,025	6,850	4,505	1,874	6,379	+ 7.4	32.8	26.6
Districts—									
1 South Central	310	105	415	278	97	375	+ 10.7	2.0	1.4
2 Middle Gulf	120	320	440	110	290	400	+ 10.0	0.8	4.1
3 Upper Gulf	420	195	615	390	181	571	+ 7.7	2.8	2.6
4 Lower Gulf S.W.	250	345	595	239	330	569	+ 4.6	1.7	4.7
Offshore	10	25	35	6	22	28	+ 25.0		0.3
5 East Central	35	20	55	30	17	47	+ 17.0	0.2	0.2
6 Northeast	90	85	175	83	78	161	+ 8.7	0.6	1.1
7-B North Central	525	165	690	490	155	645	+ 7.0	3.6	2.2
7-C West Central	490	345	835	439	309	748	+ 11.6	3.2	4.4
8 West	1,670	165	1,835	1,601	160	1,761	+ 4.2	11.7	2.3
9 North	670	95	765	627	88	715	+ 7.0	4.6	1.2
10 Panhandle	235	160	395	212	147	359	+ 10.0	1.6	2.1
Utah	125	10	135	126	10	136	− 0.7	0.9	0.1
West Virginia	225	520	745	207	471	678	+ 9.9	1.5	6.7
Wyoming	505	55	560	445	47	492	+ 13.8	3.3	0.7
Other States	5	15	20	3	17	20			0.2
Total United States	14,645	7,550	22,195	13,719	7,032	20,751	+ 7.0	100.0	100.0

(Source 6)

U.S. AVERAGE DRILLING COSTS, BY TYPE OF WELL

	PRODUCTIVE OIL WELLS				PRODUCTIVE GAS WELLS			
Year	Number	Average Depth (feet)	Total Cost Per Foot	Average Cost Per Well	Number	Average Depth (feet)	Total Cost Per Foot	Average Cost Per Well
1964	21,012	3,854	$13.13	$50,590	4,874	5,641	$18.57	$104,753
1965	18,857	4,059	13.94	56,573	4,772	5,552	18.35	101,865
1966	15,856	4,134	15.04	62,169	4,060	6,151	21.75	133,806
1967	14,935	4,013	16.61	66,647	3,558	6,116	23.05	140,995
1968	13,767	4,246	18.64	79,126	3,324	6,177	24.05	148,537
1969	12,915	4,486	19.28	86,499	3,927	6,039	25.58	154,318
1970	12,547	4,496	19.29	86,718	3,844	6,008	26.74	160,662
1971	11,405	4,260	18.41	78,431	3,679	6,013	27.70	166,582
1972	10,753	4,501	20.77	93,506	5,086	5,679	27.78	157,764
1973[a]								

	DRY HOLES				TOTAL PRODUCTIVE WELLS AND DRY HOLES			
Year	Number	Average Depth (feet)	Total Cost Per Foot	Average Cost Per Well	Number	Average Depth (feet)	Total Cost Per Foot	Average Cost Per Well
1964	17,600	4,560	$10.64	$48,512	43,486	4,340	$12.86	$55,820
1965	15,967	4,739	11.21	53,143	39,596	4,513	13.44	60,648
1966	14,605	4,615	12.34	56,949	34,521	4,575	14.95	68,386
1967	13,045	4,777	12.87	61,491	31,538	4,566	15.97	72,902
1968	12,485	5,137	12.88	66,183	29,576	4,839	16.83	81,463
1969	12,639	5,307	13.23	70,222	29,481	5,044	17.56	88,554
1970	10,786	5,320	15.22	80,942	27,177	5,037	18.84	94,885
1971	9,956	5,418	16.02	86,795	25,040	4,978	19.03	94,708
1972	10,604	5,493	17.28	94,899	26,443	5,126	20.76	106,424
1973[a]								

[a] Not available.

Source: *Joint Association Survey.*

NUMBER OF WELLS, FOOTAGE DRILLED, AND COST OF DRILLING AND EQUIPPING WELLS AND DRY HOLES

	PRODUCTIVE OIL WELLS			PRODUCTIVE GAS WELLS		
Year	Wells Drilled	Total Footage (Thousands of Feet)	Total Cost (Thousands of Dollars)	Wells Drilled	Total Footage (Thousands of Feet)	Total Cost (Thousands of Dollars)
1964	21,012	80,989	1,062,995	4,874	27,494	510,564
1965	18,857	76,548	1,066,796	4,772	26,493	486,100
1966	15,856	65,554	985,754	4,060	24,974	543,252
1967	14,935	59,934	995,369	3,558	21,762	501,661
1968	13,767	58,456	1,089,328	3,324	20,532	493,736
1969	12,915	57,934	1,117,129	3,927	23,695	606,005
1970	12,547	56,417	1,088,057	3,844	23,093	617,583
1971	11,405	48,585	894,505	3,679	22,122	612,854
1972	10,753	48,400	1,005,471	5,086	28,885	802,386
1973[a]						

	DRY HOLES			TOTAL PRODUCTIVE WELLS AND DRY HOLES		
Year	Wells Drilled	Total Footage (Thousands of Feet)	Total Cost (Thousands of Dollars)	Wells Drilled	Total Footage (Thousands of Feet)	Total Cost (Thousands of Dollars)
1964	17,600	80,263	853,808	43,486	188,746	2,427,367
1965	15,967	75,664	848,541	39,596	178,705	2,401,437
1966	14,605	67,395	831,735	34,521	157,923	2,360,741
1967	13,045	62,310	802,149	31,538	144,006	2,299,179
1968	12,485	64,141	826,296	29,576	143,129	2,409,360
1969	12,639	67,076	887,537	29,481	148,705	2,610,671
1970	10,786	57,380	873,042	27,177	136,890	2,578,682
1971	9,956	53,937	864,133	25,040	124,644	2,371,492
1972	10,604	58,251	1,006,309	26,443	135,536	2,814,166
1973[a]						

[a] Not available

Source: *Joint Association Survey*

(Source 9)

DRILLING OPERATIONS AND EXPENDITURES, BY TYPE OF WELL, 1971-1972

Note: Includes all charges for drilling and equipping wells up to and including the "Christmas" trees, but excludes exploration, development and production costs and expenditures for service wells.

	Total	Oil	Gas[a]	Dry
		1971		
Wells drilled	25,040	11,405	3,679	9,956
Footage drilled (000)	134,644	48,585	22,122	53,937
Expenditures (000)	$2,371,492	$ 894,505	$612,854	$ 864,133
Average depth per well	4,978	4,260	6,013	5,418
Average cost per well	$ 94,708	$ 78,431	$166,582	$ 86,795
Average cost per foot	$ 19.03	$ 18.41	$ 27.70	$ 16.02
		1972		
Wells drilled	26,443	10,753	5,086	10,604
Footage drilled (000)	135,536	48,400	28,885	58,251
Expenditures (000)	$2,814,166	$1,005,471	$802,386	$1,006,309
Average depth per well	5,126	4,501	5,679	5,493
Average cost per well	$ 106,424	$ 93,506	$157,764	$ 94,899
Average cost per foot	$ 20.76	$ 20.77	$ 27.78	$ 17.28

a. Includes condensate wells.

Source: American Petroleum Institute, Independent Petroleum Association of America, Mid-Continent Oil & Gas Association. *Joint Association Survey of Industry Drilling Costs*, 1972.

OFF SHORE DRILLING OPERATIONS AND EXPENDITURES, BY TYPE OF WELL, 1971-1972

Note: Includes all charges for drilling and equipping wells up to and including the "Christmas" trees, but excludes exploration, development and production costs and expenditures for service wells.

	Total	Oil	Gas[a]	Dry
		1971		
Wells drilled	884	309	185	390
Footage drilled (000)	9,007	2,913	2,035	4,059
Expenditures (000)	$ 522,617	$ 163,352	$141,545	$ 217,720
Average depth per well	10,189	9,427	11,000	10,408
Average cost per well	$ 591,196	$ 528,647	$765,108	$ 558,256
Average cost per foot	$ 58.02	$ 56.08	$ 69.56	$ 53.64
		1972		
Wells drilled	993	332	230	431
Footage drilled (000)	10,001	3,274	2,461	4,267
Expenditures (000)	$ 632,449	$ 213,036	$175,826	$ 243,588
Average depth per well	10,072	9,860	10,698	9,900
Average cost per well	$ 636,908	$ 641,674	$764,460	$ 565,169
Average cost per foot	$ 63.24	$ 65.07	$ 71.44	$ 57.09

a. Includes condensate wells.

Source: American Petroleum Institute, Independent Petroleum Association of America, Mid-Continent Oil & Gas Association. *Joint Association Survey of Industry Drilling Costs*, 1972.

SHALE OIL
UNITED STATES RESERVES

U.S. ESTIMATED SUPPLY FUNCTION FOR SHALE OIL

	Billion Barrels	Quadrillion Btu
Recoverable Resources 1/	2,200	12,760
Recoverable Proved Reserves 2/	80	464

1/ Recoverable resources are resources that could be made available under certain technological and economic conditions. For shale oil this includes paramarginal and submarginal identified oil-shale deposits that have mapped and sampled sufficiently to determine size and oil-yielding potential with moderate accuracy.

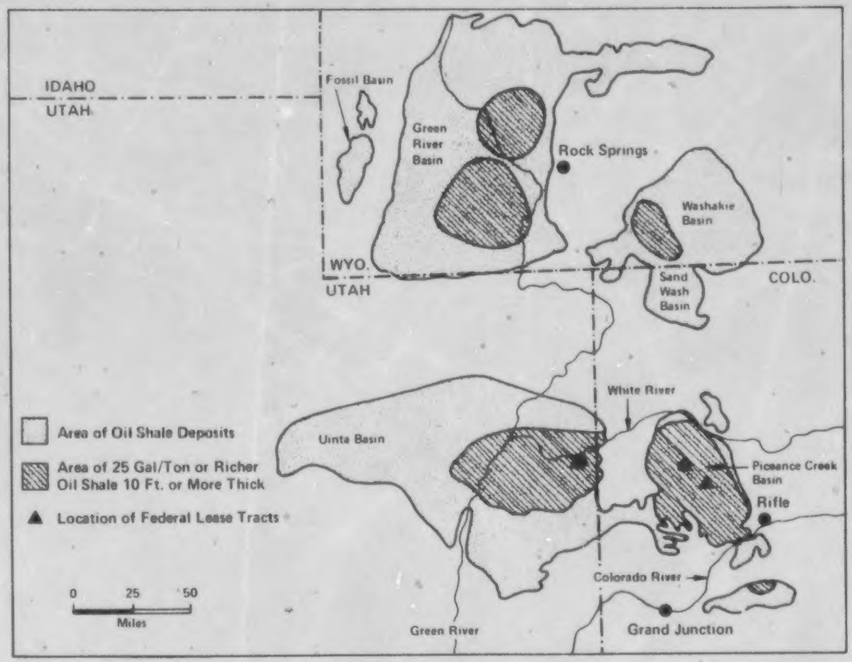
2/ Reserves recoverable under existing operating and economic conditions. For shale oil this represents identified paramarginal oil shale resources estimated to contain about 80 billion barrels of oil recoverable at the 1973 price for domestically produced crude oil.

Sources: Energy Resources of the United States, U.S. Geological Survey Circular 650, U.S. Geological Survey, Wash., D.C., 1972; National Petroleum Council, Committee on U.S. Energy Outlook, 1971, U.S. Energy Outlook, Wash., D.C. Vol. 1 and 2; U.S. Dept. of the Interior, Commodity Data Summaries 1974.

Prepared by: Office of Economics, Federal Power Commission.

(Source 17)

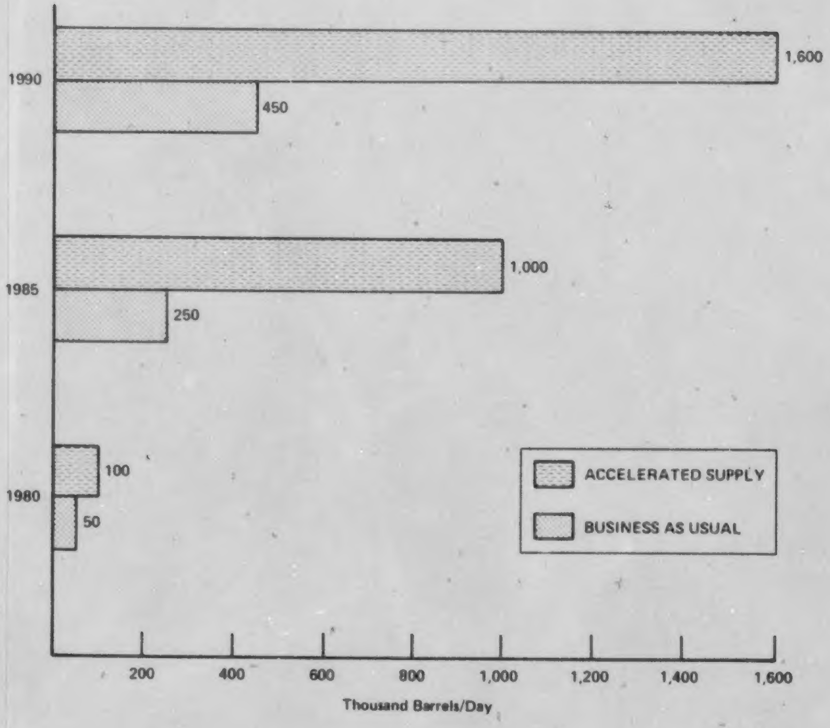
U.S. Oil Shale Deposits, Green River Formation


IDAHO
UTAH
Fossil Basin
Green River Basin
Rock Springs
Washakie Basin
WYO.
UTAH
Sand Wash Basin
COLO.
White River
Uinta Basin
Piceance Creek Basin
Rifle
Colorado River
Grand Junction
Green River
Area of Oil Shale Deposits
Area of 25 Gal/Ton or Richer Oil Shale 10 Ft. or More Thick
Location of Federal Lease Tracts
0
25
50
Miles

UNITED STATES PRODUCTION

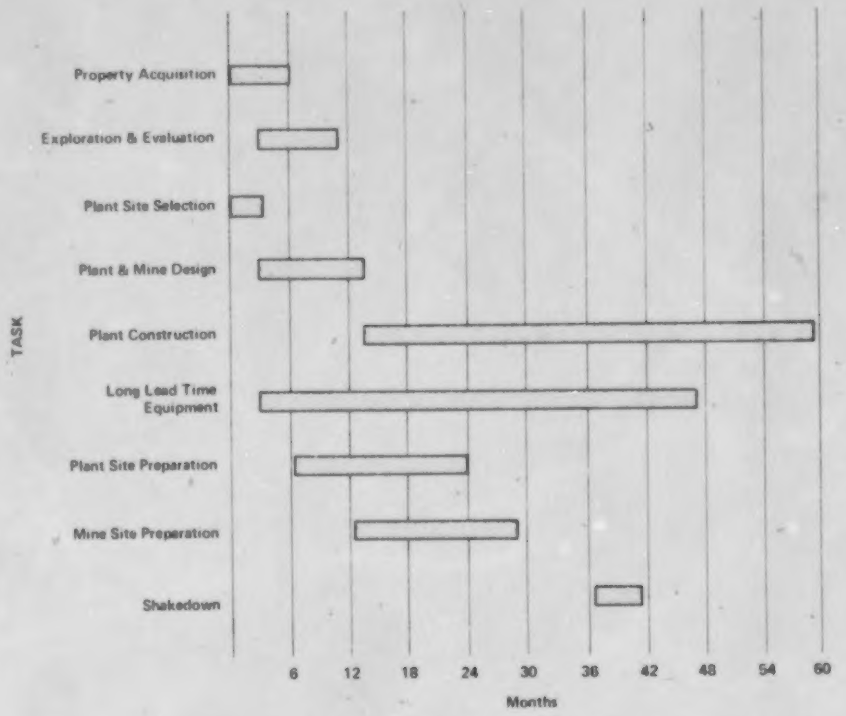
(Source 17)

U.S. Shale Oil Production Potential, 1980-90



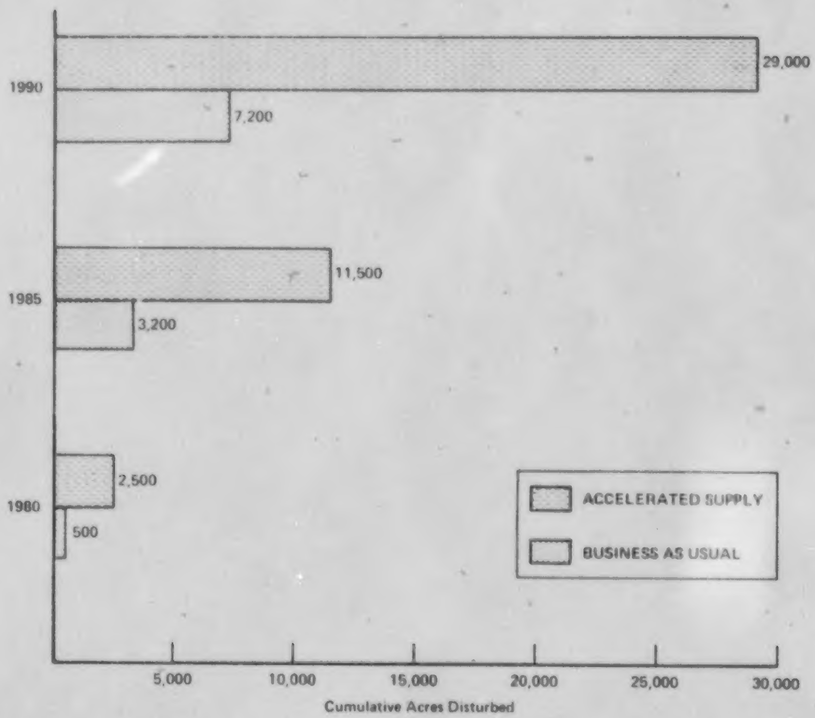
(Source 17)

Shale Oil Production Lead Times, Concurrent Activities Schedule



(Source 17)

Land Impacts, Shale Oil Production, 1980-90



(Source 41)

ENERGY BALANCE, OIL SHALE TO GASOLINE AND DISTILLATE FUEL
(50,000 bbl/day Plant)

	10^6 Btu/day
Input	
Oil Shale (85,780 tons/day X 2000 X 2640 Btu/lb)	452,918
Electricity (92,100 kWhr/day X 3413 Btu/kWhr)	314
Natural Gas (3,610,000 SCF/day X 1000 Btu/SCF)	3,610
Total Input	456,842
Output	
Motor Gasoline (25,193 bbl/day X 5.4 million Btu/bbl)	136,042
Jet Fuel (4471 bbl/day X 5.4 million Btu/bbl)	24,143
Distillate Fuel (20,336 bbl/day X 5.6 million Btu/bbl)	113,882
n-Butane (1613 bbl/day X 4.325 million Btu/bbl)	6,976
Decant Oil (191 bbl/day X 6 million Btu/bbl)	1,146
Coke (932 tons/day X 2000 X 14,000 Btu/lb)	26,096
Sulfur (47 tons/day X 2000 X 3983 Btu/lb)	374
Ammonia (150 tons/day X 2000 X 9675 Btu/lb)	2,902
Spent Shale (65,713 tons/day X 2000 X 305 Btu/lb)	40,085
Cooling by Air and Water	64,852
Other (by difference)*	40,344
Total Output	456,842

*Includes sensible heat of product streams, heating values of other unaccounted-for products, and heat lost to the atmosphere.

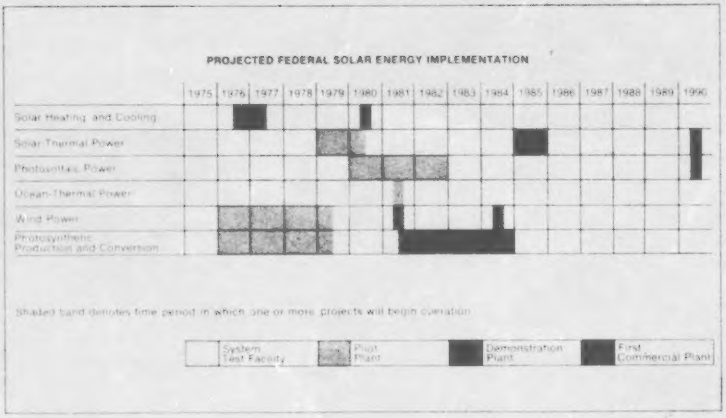
(Source 41)

INVESTMENT COST FOR THE PRODUCTION OF 50,000 bbl/DAY OF GASOLINE PLUS LIGHT DISTILLATE FROM 30 gal/TON COLORADO OIL SHALE

Components	Mid-1973 Cost, $1000
Mining (Initial investment and present worth of deferred investment)	53,772
Retorting (Includes crushing, screening, and briquetting)	89,899
Crude Shale Oil and Gas Upgrading	78,815
Syncrude Refining for the Production of Gasoline and General Facilities for Refinery	73,415
Particulate Emission Control	5,740
Spent Shale Disposal	17,000
Initial Catalyst	5,517
Utilities	28,837
General Facilities	21,486
Total	374,481
Contractor's Overhead and Profit (10%)	37,448
	411,929
Contingencies (15%)	61,789
Total Plant Investment	473,718
Interest During Construction (0.23676 X I)	112,158
Start-Up Cost (20% of gross operating cost)	11,604
Working Capital	
a. Raw Material Inventory (60 days feed at full rate)	3,978
b. Material and Supplies (0.9% of total plant investment)	4,263
c. Net Receivables (1/24 X Annual Revenue Received)	7,165
Total Capital Required	612,886

SOLAR ENERGY
MISCELLANEOUS DATA

(Source 27)



Staged development of solar energy mechanisms under the federal research program forecasts commercial use of solar heating and cooling in five years. Except for wind energy, other solar techniques are long-term alternatives.

(409)

(Source 44)

ESTIMATES OF POTENTIAL IMPACTS OF SOLAR ENERGY TECHNOLOGIES
(Units of Equivalent Millions of Barrels per Day of Fuel Oil Saved)

	1980	1985	1990	1995	2000
Heating and Cooling	0.5 (0.01)	0.8 (0.5)	2.5 (0.8)	3.8 (1.9)	5.5 (3.6)
Solar Thermal	0 (0)	0.003 (0.003)	0.03 (0.03)	0.3 (0.2)	1.9 (0.8)
Wind Conversion	0.02 (0.01)	0.8 (0.6)	3.0 (2.5)	5.2 (4.1)	7.9 (6.3)
Bioconversion	0.03 (0.03)	0.14 (0.05)	0.4 (0.1)	1.6 (0.2)	7.1 (0.3)
Ocean Thermal	0 (0)	0.05 (0.05)	0.3 (0.2)	1.6 (0.5)	11 (2.7)
Photovoltaic Conversion	Neg. (Neg.)	0.02 (0.005)	0.5 (0.1)	3.8 (0.5)	11 (2.5)
Potential Total Oil Imports Replaced	0.5 (0.05)	1.8 (1.2)	7 (3.7)	16 (7)	44 (16)
Value of Oil Saved **at $11/BBL**	$2B/YR ($0.2B/YR)	$8B/YR ($6B/YR)	$27B/YR ($14B/YR)	$66B/YR ($30B/YR)	$176B/YR ($66b/YR)

Footnote: Numbers shown without parentheses are for the "Accelerated" implementation scenario; those shown in parentheses are for the "Business-as-Usual" implementation scenario.

(Source 44)

SUMMARY OF POTENTIAL IMPACTS OF SOLAR ENERGY TECHNOLOGIES

(Units of 10^{15} Btu/Yr of Output Energy Provided by Solar Energy Systems)

	1980	1985	1990	1995	2000
Heating and Cooling	0.3 (0.01)	0.6 (0.3)	1.5 (0.6)	2.4 (1.3)	3.5 (2.3)
Solar Thermal	.0 (.0)	0.002 (0.002)	0.02 (0.02)	0.[illegible] (0.1)	1.3 (0.6)
Wind Conversion	0.01 (0.008)	0.5 (0.4)	2.0 (1.6)	3.4 (2.7)	5 (4.0)
Bioconversion	0.06 (0.06)	0.3 (0.1)	0.9 (0.2)	3.3 (0.4)	15 (0.7)
Ocean Thermal	0 (0)	0.03 (0.03)	0.2 (0.1)	1.0 (0.4)	7 (1.7)
Photovoltaic Conversion	Neg. (Neg.)	0.01 (0.003)	0.3 (0.07)	2.4 (0.3)	7 (1.5)
Total U.S. Demand*	93	120	144	165	180

. Assumptions include (1) the successful completion of the recommended R&D program plan for solar energy technologies; and, (2) conventional fuel prices equivalent to $11 per barrel of oil.

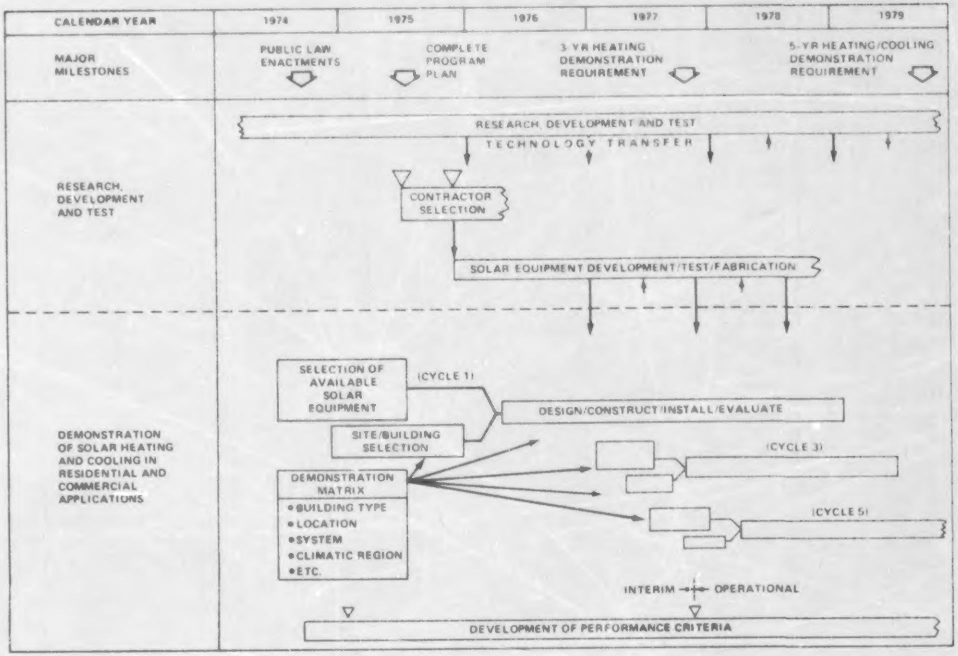
. Numbers shown without parentheses are for the Accelerated implementation plan; those shown in parentheses are for the Business-as-Usual implementation plan.

---

* Estimates based on pre-embargo analyses. See, "The Nation's Energy Future", AEC, 1 December 1973.

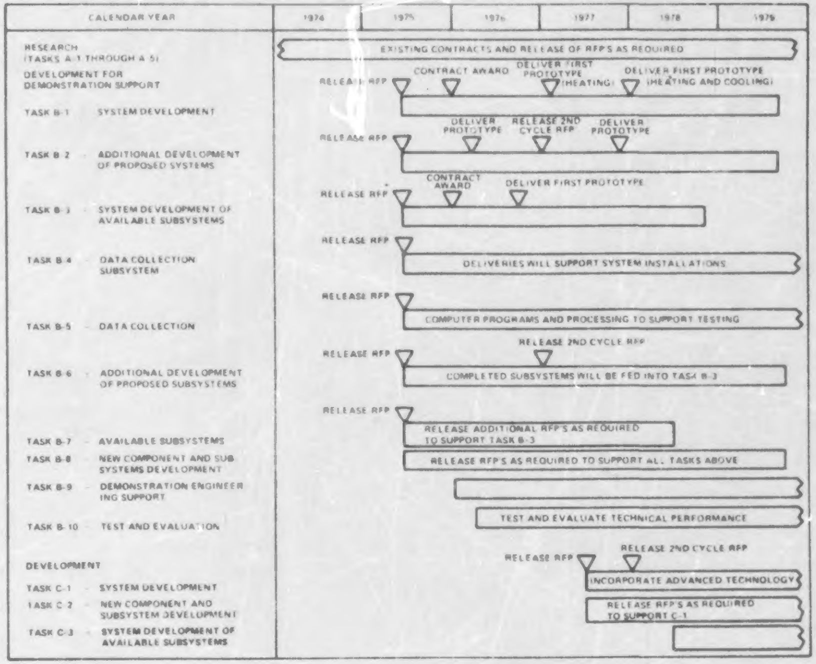
(Source 19)

SUMMARY SCHEDULE FOR SOLAR HEATING AND COOLING PROGRAM


CALENDAR YEAR
1974
1975
1976
1977
1978
1979
MAJOR MILESTONES
PUBLIC LAW ENACTMENTS
COMPLETE PROGRAM PLAN
3-YR HEATING DEMONSTRATION REQUIREMENT
5-YR HEATING/COOLING DEMONSTRATION REQUIREMENT
RESEARCH, DEVELOPMENT AND TEST
RESEARCH, DEVELOPMENT AND TEST
TECHNOLOGY TRANSFER
CONTRACTOR SELECTION
SOLAR EQUIPMENT DEVELOPMENT/TEST/FABRICATION
DEMONSTRATION OF SOLAR HEATING AND COOLING IN RESIDENTIAL AND COMMERCIAL APPLICATIONS
SELECTION OF AVAILABLE SOLAR EQUIPMENT
(CYCLE 1)
DESIGN/CONSTRUCT/INSTALL/EVALUATE
SITE/BUILDING SELECTION
DEMONSTRATION MATRIX
• BUILDING TYPE
• LOCATION
• SYSTEM
• CLIMATIC REGION
• ETC.
(CYCLE 3)
(CYCLE 5)
INTERIM
OPERATIONAL
DEVELOPMENT OF PERFORMANCE CRITERIA

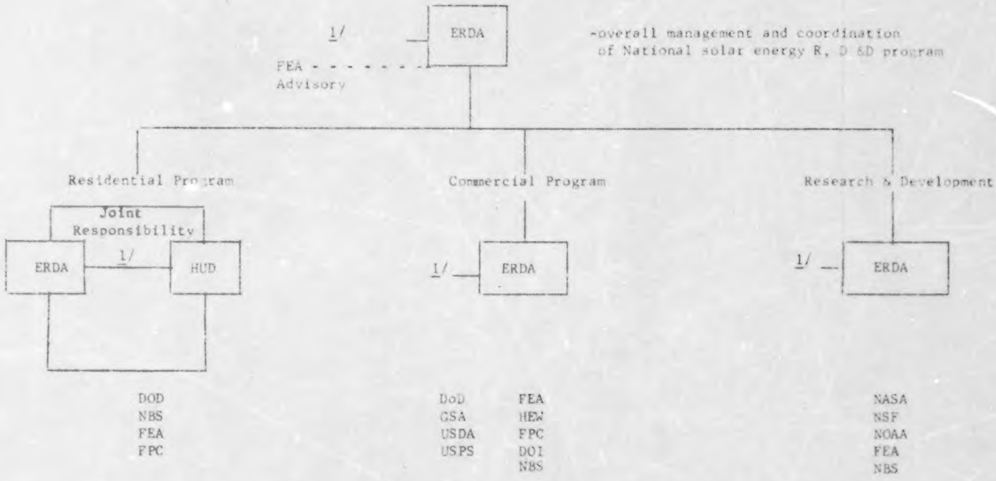
(Source 19)

SUMMARY SCHEDULE FOR SOLAR HEATING AND COOLING RESEARCH AND DEVELOPMENT



(Source 19)

PRIMARY AGENCY MANAGEMENT ROLES FOR SOLAR HEATING AND COOLING


1/
ERDA
-overall management and coordination of National solar energy R, D &D program
FEA - - - - - - - -
Advisory
Residential Program
Commercial Program
Research & Development
Joint Responsibility
ERDA
1/
HUD
1/
ERDA
1/
ERDA
DOD
NBS
FEA
FPC
DoD
GSA
USDA
USPS
FEA
HEW
FPC
DOI
NBS
NASA
NSF
NOAA
FEA
NBS

1/ IPTASE, Industry Review Board, Utilities advise each major decision making entity.

(Source 19)

Number of Annual Housing Starts
and the Equivalent Annual Fuel Savings Using Solar Energy

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Annual Starts[1]	0.1	0.3	1	5	20	50	70	100	150	200
Cummulative Starts[1]	0.1	0.4	1.4	6.4	26.4	76.4	146.4	246.4	396.4	596
Annual Fuel Savings[2]	2.4	9.6	33.7	154.2	636.2	1841.2	3528.2	5938.2	9553.2	14,373

---

[1] In thousands of units.

[2] In thousands of barrels of oil equivalent energy saved per year where:

$$\frac{\text{Energy saved}}{\text{Dwelling unit}} = \frac{150{,}000\ \text{BTU}}{\text{ft}^2 - \text{year}} \times \frac{1500\ \text{ft}^2}{\text{Dwelling unit}} \times \frac{\text{bbl}}{5{,}600{,}000\ \text{BTU}} \times .6\ \text{solar substitution} =$$

$$\frac{225 \times 10^6\ \text{bbl} \times 0.6}{5.6 \times 10^6\ \text{dwelling unit-year}} = \frac{24.1\ \text{bbl}}{\text{dwelling unit-year}}$$

(Source 19)

Number of Annual Commercial Starts
and the Equivalent Annual Fuel Savings Using Solar Energy

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Annual Starts[1/]	0.01	0.03	0.1	0.5	2	5	7	10	15	15
Cumulative Starts[1/]	0.01	0.04	0.14	0.64	2.64	7.64	14.64	24.64	39.64	54.64
Annual Fuel Savings[2/]	3.2	12.8	44.9	205.4	847.4	2652.4	4699.4	7909.4	12,724.4	17,539.4

[1/] In thousands of units.

[2/] In thousands of barrels of oil equivalent energy saved per year where:

$$\frac{\text{Energy saved}}{\text{Commercial unit}} = \frac{200{,}000\ \text{BTU}}{\text{ft}^2\text{-year}} \times \frac{15{,}000\ \text{ft}^2}{\text{Commercial unit}} \times \frac{\text{bbl}}{5{,}600{,}000\ \text{BTU}} \times .6\ \text{solar substitution} =$$

$$\frac{300 \times 10^7\ \text{bbl.} \times 0.6}{5.6 \times 10^6\ \text{Commercial unit-year}} = \frac{321\ \text{bbl}}{\text{Commercial unit-year}}$$

(Source 19)

Number of Commercial Retrofits
and the Equivalent Annual Fuel Savings Using Solar Energy

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Annual Retrofits[1/]	0.1	0.6	1	2	3	2	2	1	1	0.5
Cumulative Retrofits[1/]	0.1	0.7	1.7	3.7	6.7	8.7	10.7	11.7	12.7	13.2
Annual Fuel Savings[2/]	32.1	224.1	545.7	1187.7	2150.7	2,792.7	3434.7	3755.7	4076.7	4237.2
Total Annual Fuel Savings[3/]	40	250	620	1550	3630	7090	11,660	17,600	26,350	36,150

[1/] In thousands of units

[2/] In thousands of barrels of oil equivalent energy saved per year where:

$$\frac{\text{Energy saved}}{\text{Commercial unit}} = \frac{200{,}000\ \text{BTU}}{\text{Ft}^2 - \text{year}} \times \frac{15{,}000\ \text{ft}^2}{\text{Commercial unit}} \times \frac{\text{bbl}}{5{,}600{,}000\ \text{BTU}} \times .6 \text{ solar substitution} =$$

$$\frac{300 \times 10^7\ \text{bbl.} \times 0.6}{5.6 \times 10^6\ \text{Commercial unit-year}} = \frac{321\ \text{bbl}}{\text{Commercial unit-year}}$$

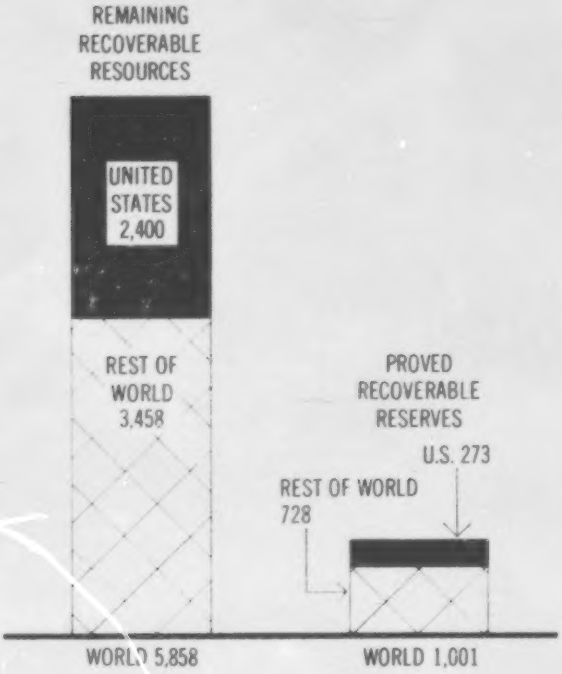
[3/] In thousands of barrels of oil equivalent energy saved per year where the total saved is the sum of the Annual Fuel Savings for Commercial Starts, Residential Starts and Commercial Retrofits tabulated in Tables A-II-1, A-II-2 and A-II-3. Rounded to nearest 10,000.

URANIUM

UNITED STATES AND FOREIGN STATISTICS

(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR URANIUM
(Thousand Short Tons)



(Source 10)

ESTIMATED WORLD SUPPLY FUNCTION FOR URANIUM

(U_3O_8, Equivalent Uranium Oxide in the Ground)

	Thousand Short Tons U_3O_8	Quadrillion Btu 3/
Remaining Recoverable Resources 1/		
United States	2,400	1,411
Rest of World	3,458	2,034
World	5,858	3,445
Proved Recoverable Reserves 2/		
United States	273	160
Rest of World	728	428
World	1,001	588

1/ Recoverable resources are resources that could be made available under certain technological and economic conditions. For uranium, this includes recoverable and submarginal deposits as identified resources and undiscovered resources in known districts. Resources are in terms of short tons of uranium oxide (U_3O_8) equivalent in the ground. The estimates are based on conventional resources at a cut-off of $30 per pound.

2/ Reserves recoverable under existing operating and economic conditions. For U_3O_8 this represents identified recoverable resources in conventional deposits based on a cut-off price of $8 per pound of U_3O_8.

3/ Thermal efficiency in light water reactors under present technology. Theoretical maximum energy equivalent is approximately 120 times greater.

Sources: Nuclear Power and Uranium by John A. Patterson, AEC, Oct. 13 1972; Energy Resources of the United States, U.S. Geological Survey Circular 650, U.S. Geological Survey, Washington, D. C., 1972; Statistical Data of the Uranium Industry, Jan. 1, 1972, U.S. Atomic Energy Commission; 1970 Ed. Minerals Facts and Prob., United States Department of the Interior; Commodity Data Summaries 1974 Bureau of Mines, U.S. Dept. of Interior.

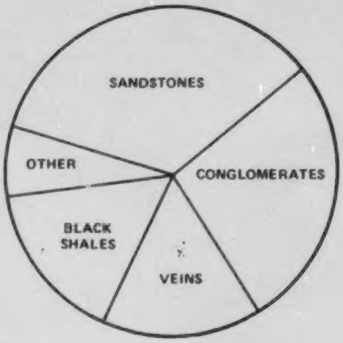
Prepared by: Office of Economics, Federal Power Commission

(Source 21)

WORLD URANIUM RESERVES – $15 PER LB. U_3O_8
(EXCLUDES PEOPLES REPUBLIC OF CHINA, USSR AND ASSOCIATED STATES OF EASTERN EUROPE)

$15 REASONABLY ASSURED (RESERVES)	TONS $U_3O_8 \times 10^3$*	%
SANDSTONES	760	35
CONGLOMERATES	590	27
VEINS AND RELATED TYPES	320	15
BLACK SHALES	350	16
OTHER	140	7
TOTAL	2160	100

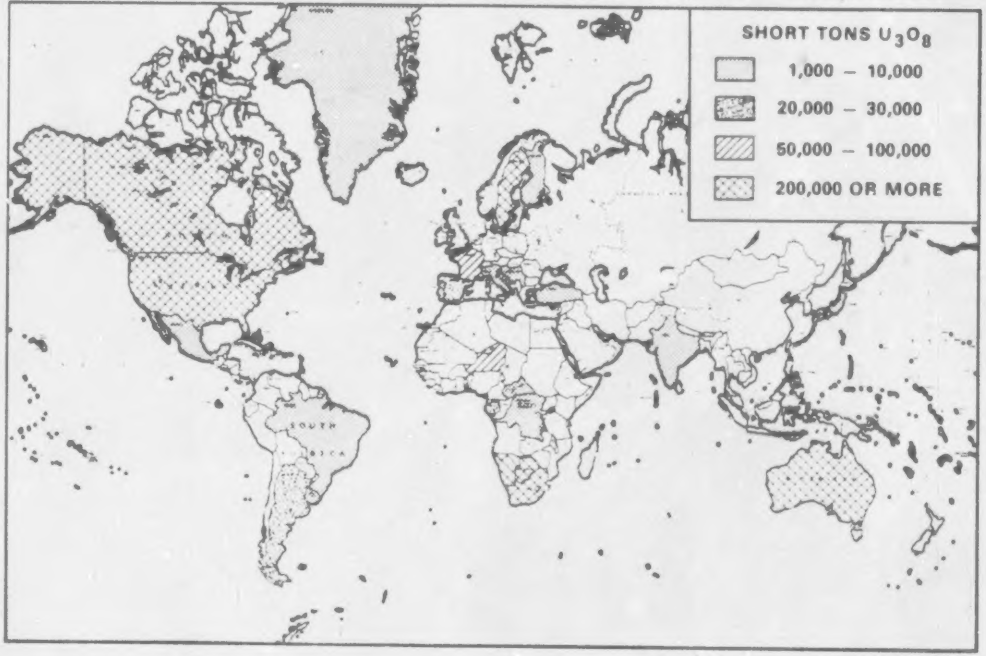
*1.3 TONS U_3O_8 = 1 METRIC TONNE (1000 Kg) U



(Source 21)

WORLD URANIUM RESOURCES

REASONABLY ASSURED RESERVES @ $15 PER POUND U_3O_8
(Mainland China, USSR, and Eastern Europe Not Reported)

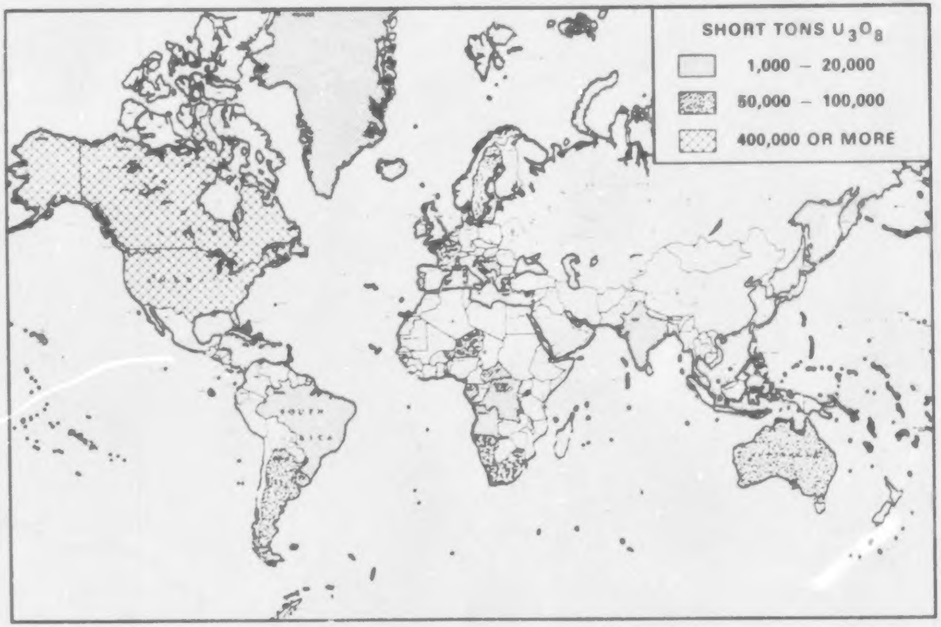

SHORT TONS U_3O_8
1,000 – 10,000
20,000 – 30,000
50,000 – 100,000
200,000 OR MORE
SOUTH AMERICA

(Source 21)

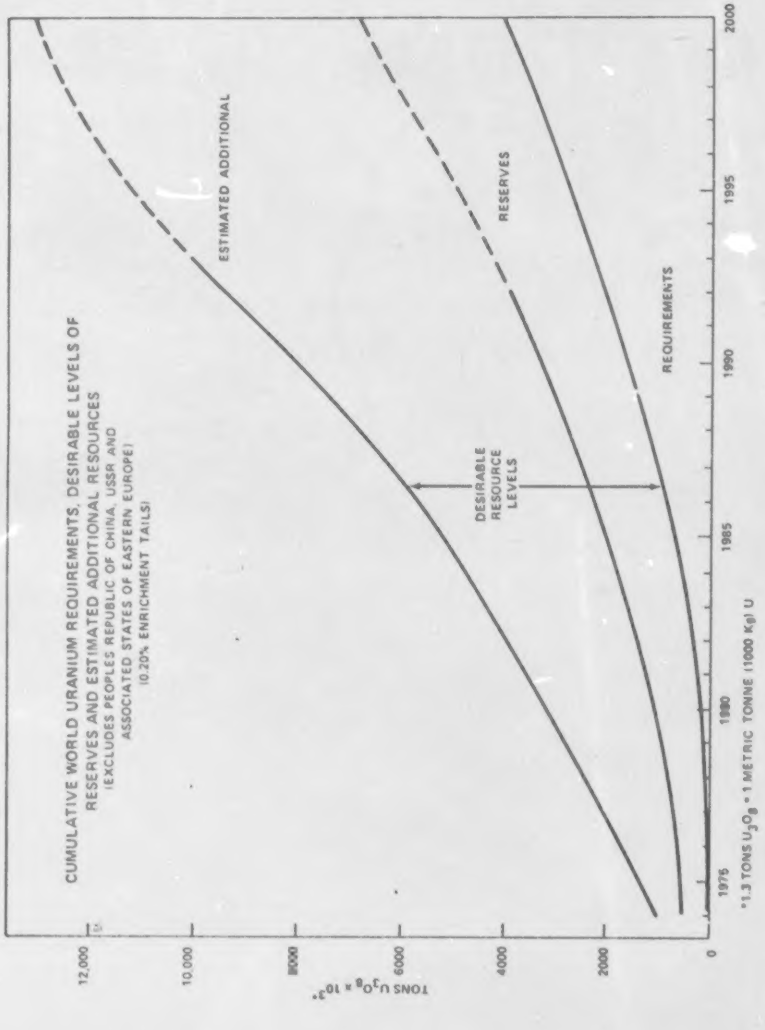
WORLD URANIUM RESOURCES

ESTIMATED ADDITIONAL RESOURCES @ $15 PER POUND U_3O_8

(Mainland China, USSR, and Eastern Europe Not Reported)

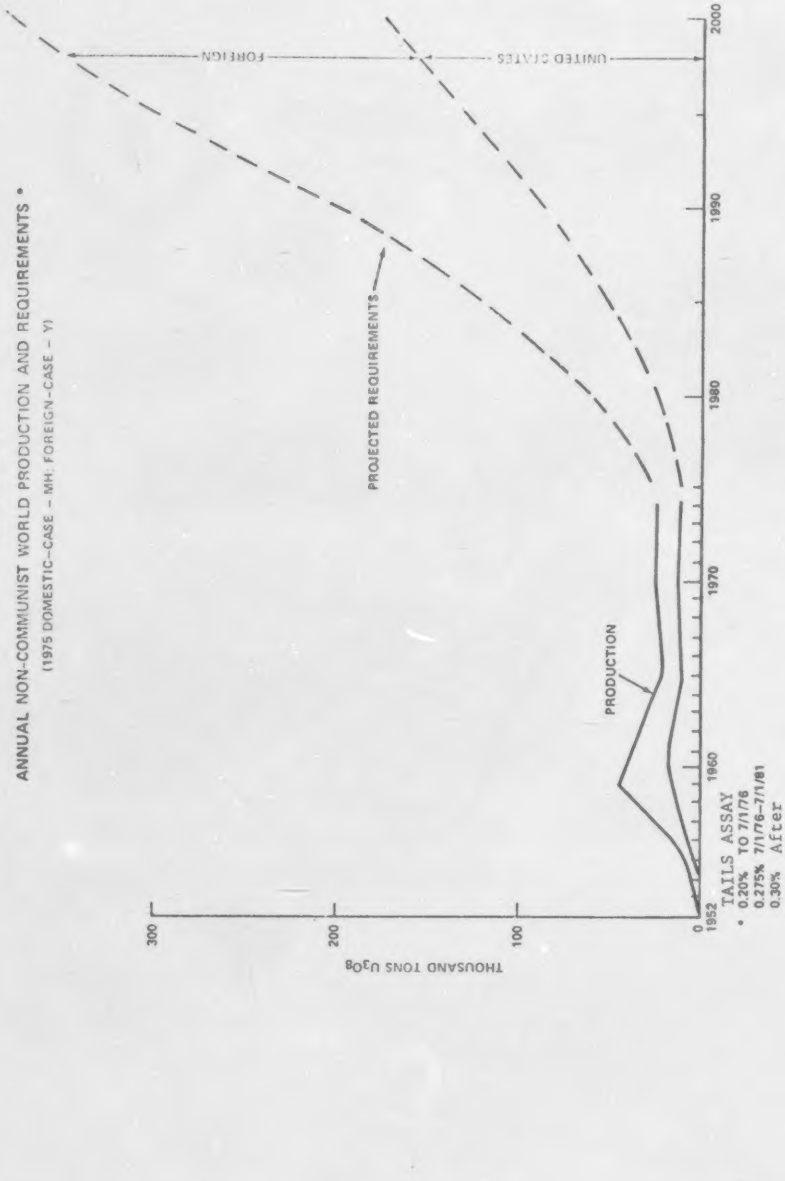

SHORT TONS U_3O_8
1,000 – 20,000
50,000 – 100,000
400,000 OR MORE
SOUTH AMERICA

(Source 21)



CUMULATIVE WORLD URANIUM REQUIREMENTS, DESIRABLE LEVELS OF RESERVES AND ESTIMATED ADDITIONAL RESOURCES
(EXCLUDES PEOPLES REPUBLIC OF CHINA, USSR AND ASSOCIATED STATES OF EASTERN EUROPE)
(0.20% ENRICHMENT TAILS)

*1.3 TONS U_3O_8 = 1 METRIC TONNE (1000 Kg) U



(Source 14)

ANNUAL NON-COMMUNIST WORLD PRODUCTION AND REQUIREMENTS *

(1975 DOMESTIC-CASE – MH; FOREIGN-CASE – Y)

TAILS ASSAY
* 0.20% TO 7/1/76
0.275% 7/1/76–7/1/81
0.30% After

(Source 33)

FOREIGN URANIUM COMMITMENTS
BY DOMESTIC PRODUCERS
AS OF JANUARY 1, 1975

Year of Delivery	Tons U_3O_8
1966 thru 73	5,500
74	1,500
75	600
76	500
77	1,400
78 and 79	1,100
Total	10,600

As of January 1, 1974, total was 6,900 tons, 3,700 were committed to foreign buyers in 1974.

(Source 33)

URANIUM DELIVERY COMMITMENTS

IMPORTS BY DOMESTIC BUYERS

(Tons of U_3O_8)
As of January 1, 1975

Year of U_3O_8 Delivery	Annual	Cumulative
1975	800	800
1976	1,500	2,300
1977	2,600	4,900
1978	3,100	8,000
1979	3,000	11,000
1980	2,700	13,700
1981	3,500	17,200
1982	3,700	20,900
1983	3,600	24,500
1984	3,600	28,100
1985	3,400	31,500
1986	2,300	33,800
1987 - 1990	< 2,000/yr.	41,000

UNITED STATES RESERVES AND RESOURCES

(Source 13)

The Energy Research and Development Administration (ERDA) estimates that United States uranium reserves, as of January 1, 1975, were 200,000 tons of uranium oxide (U_3O_8) contained in 83 million tons of ore with an average grade of about 0.24 percent U_3O_8, recoverable at a cost of $8 or less per pound.

These estimates compare with last year's survey of 277,000 tons of U_3O_8 in 129 million tons of ore. The reduction does not indicate a decrease in the amount of uranium ore present in the ground but does indicate that this amount of uranium is no longer in the $8 cost category.

Estimates are made by evaluating original drilling and other data furnished by the uranium mining industry to ERDA's Grand Junction, Colorado, Office.

Additions to $8 reserves in 1974 contained an estimated 13,000 tons of U_3O_8. However, during the year about 12,600 tons of U_3O_8 were mined and shipped to mills, and 77,000 tons were subtracted from the $8 reserve category, primarily due to inflation and added to higher cost reserves.

Estimated operating and forward capital costs were used by ERDA in calculating reserves. Profit and "sunk" costs, such as expenditures for property acquisition, exploration, and mine development, are not included. Therefore, the figure of $8 per pound does not represent the price at which the estimated reserve would be sold.

(Source 13)

ESTIMATED URANIUM ORE RESERVES, JANUARY 1, 1975

Cutoff Costs Dollars/Lb. U_3O_8	Tons U_3O_8
$8	200,000
$10	315,000[1/]
$15	420,000[1/]
$30	600,000[1/]

[1/] Includes the lower cost reserves.

New Mexico and Wyoming continue to be the leading uranium producing states with a combined total of 85 percent of the nation's uranium reserves at a cost of $10 or less per pound U_3O_8. In view of the escalation in mining and milling costs and increasing uranium prices, data on reserves at a cost of $10 per pound U_3O_8 are considered to be of primary interest. Estimated year-end ore reserves by states at a cost of $10 per pound were:

ESTIMATED ORE RESERVES BY STATES, JANUARY 1, 1975

State	Tons of Ore (Millions)	Grade of Ore (% U_3O_8)	Tons of U_3O_8	Percent of Total Tons U_3O_8
New Mexico	74.8	0.22	168,000	53
Wyoming	62.2	0.16	102,000	32
Colorado	2.9	0.28	8,000	3
Utah	2.8	0.21	6,000	2
Others (Ariz., N.D., S.D., Texas, Wash., Oregon, Montana, Calif, Alaska)	24.9	0.12	31,000	10
Total	167.6	0.19	315,000	100

(Source 13)

The distribution of year-end reserves ($10 per pound U_3O_8) by region was:

Region	Tons U_3O_8
Colorado Plateau (Ariz., Colo., N.M., and Utah)	181,000
Wyoming Basins	102,000
Others (Gulf Coast, Basin & Range) Rocky Mountains)	32,000
Total	315[illegible]0

POTENTIAL RESOURCES

As a result of the long-term uranium supply outlook, a great deal of attention is being given by government and private groups to the assessment of potential (undiscovered) resources and to the prospects for discovering new uranium districts. Furthermore, due to recent uranium price increases and the growing awareness of the magnitude of future needs, there is more interest in low-grade resources and in obtaining uranium as a by-product from other sources.

During 1974, the Atomic Energy Commission (whose research and development activities were absorbed into ERDA as of January 19, 1975) greatly expanded the scope of its program to assess potential uranium resources and implemented plans to investigate all parts of the U.S., including Alaska, and to evaluate geologic formations not previously considered. Preliminary and incomplete estimates of undiscovered resources resulting from the new program are shown below, separated into three categories to indicate degree of reliability.

POTENTIAL RESOURCES, JANUARY 1, 1975

TONS U_3O_8

Class	$8	$10 1/	$15 1/	$30 1/
Probable	300,000	460,000	680,000	1,140,000
Possible	200,000	390,000	640,000	1,340,000
Speculative	30,000	110,000	210,000	410,000
	530,000	960,000	1,530,000	2,890,000

1/ Includes lower cost resources

(Source 13)

The three classes of potential are arranged in order of decreasing reliability from top to bottom. Generally speaking, "probable" potential is in existing mining districts and productive formations; "possible" potential is in productive provinces and productive formations; "speculative" is in new provinces or new formations. The estimates of speculative potential, made solely on geologic inference for unexplored areas, have a reliability considerably less than either probable or possible potential estimates for areas in which considerable exploration has occurred. Continuing extensive geological and geophysical investigation and drilling will be required to discover and to convert the potential into reserves.

The estimates of potential resources as of January 1, 1974, were 450,000 tons U_3O_8 at $8 per pound U_3O_8 and 1,000,000 tons U_3O_8 at $15 per pound. The current potential estimates are not directly comparable to the January 1, 1974, estimates, which were confined to known productive formations and favorable geologic environments. The new definitions adopted for ERDA uranium resource assessment are designed for a nationwide evaluation that includes geologic environments and geographical areas not previously appraised.

The distribution of estimated year-end potential resources at $10 per pound by region was:

	Tons U_3O_8		
Region	Probable	Possible	Speculative
Colorado Plateau (Ariz., Colo., N.M., & Utah)	205,000	280,000	30,000
Wyoming Basins	125,000	25,000	10,000
Others (Texas Gulf Coast, Basin & Range, Sierra Nevada, Western Great Plains)	130,000	85,000	70,000
Total	460,000	390,000	110,000

(Source 14)

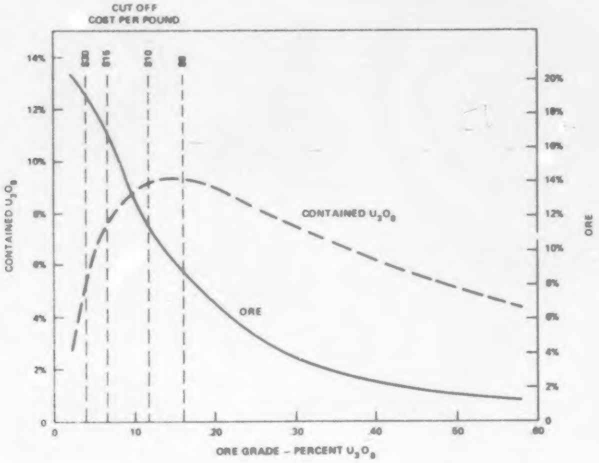
URANIUM RESOURCES - JANUARY 1, 1975

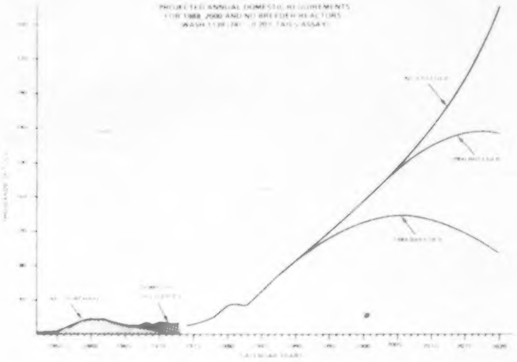
	Tons U_3O_8				
		Potential			
	Reserves	Probable	Possible	Speculative	Total
$8	200,000	300,000	200,000	30,000	730,000
$8-10 Increment	115,000	160,000	190,000	80,000	545,000
$10	315,000[1/]	460,000	390,000	110,000	1,275,000
$10-15 Increment	105,000	220,000	250,000	100,000	675,000
$15	420,000	680,000	640,000	210,000	1,950,000
$15-30 Increment	180,000	460,000	700,000	200,000	1,540,000
$30	600,000	1,140,000	1,340,000	410,000	3,500,000 (Rounded)

1/ An additional 90,000 tons U_3O_8 may be recovered as a by-product of phosphate and copper production through year 2000.

(Source 21)

INCREMENTAL DISTRIBUTION OF RESERVES BY GRADE AND CUTOFF COST PER POUND
FOR A TYPICAL SANDSTONE TYPE URANIUM DEPOSIT





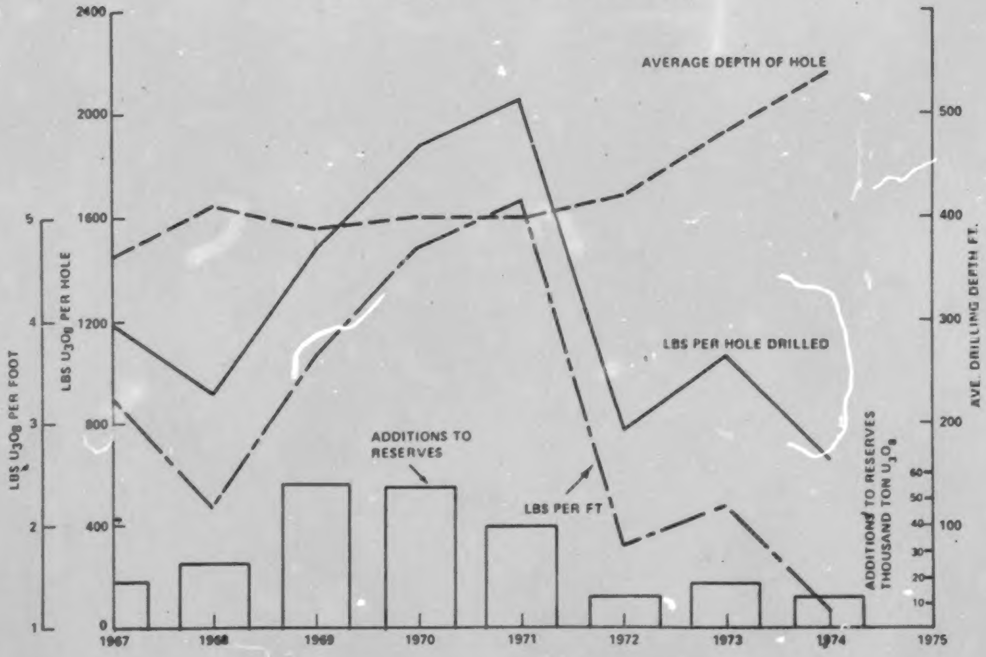
(Source 14)

INDICATORS OF TREND OF FUTURE U. S. URANIUM RESOURCE DEVELOPMENT

Positive	Negative
Substantially Larger Resources	Minor Additional or Inadequate Resources
Experience is that mineral resources ultimately prove larger than current estimates.	Exploration and appraisal effort more intensive than for other minerals; future growth may have been anticipated by present potential estimates.
Substantial portion of U. S. incompletely explored.	Some exploration has been done over most of U. S.
Exploration continues to add to resources.	Exploration success per unit of effort has been decreasing. No new major districts found in 17 years.
Radioactivity simplifies exploration.	Increases likelihood that best resources are already found.
Known reserves are in a few small areas.	Resources may be restricted to known areas for geologic reasons. U. S. deficient in several minerals.
Large low grade but economic deposits exist elsewhere in the world.	Similar geologic environments in U. S. are limited.
Nuclear power costs insensitive to higher uranium prices. Price increases will stimulate exploration.	Time frame short - 30-50 years. Long lead times, competition for capital, market uncertainties, and inflation delay action.
Large areas of the world have not been explored.	Political considerations limit foreign exploration and restrict acces to foreign supplies.

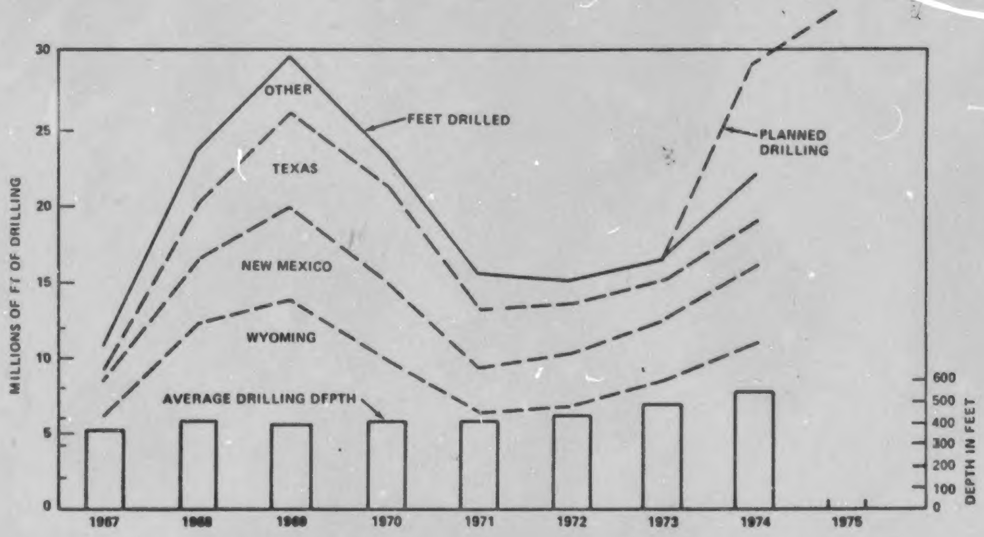
(Source 14)

EXPLORATION ACTIVITY - RESERVES ADDITIONS



(Source 14)

DRILLING ACTIVITY AND HOLE DEPTHS



UNITED STATES PRODUCTION

(Source 13)

URANIUM PRODUCTION

Uranium ore production (ore weighed and sampled by mills) during 1974 by states was:

Uranium Ore Production - 1974

State	Tons of Ore (Millions)	Contained Tons of U_3O_8	% of Total (U_3O_8)
New Mexico	3.0	5,400	43
Wyoming	2.5	4,000	32
Others (Colo., Texas, Utah, & Wash.)	1.6	3,200	25
Total	7.1	12,600	100

Concentrate production was 11,500 tons of U_3O_8 in 1974 compared to 13,200 tons in 1973. Concentrate production by state was:

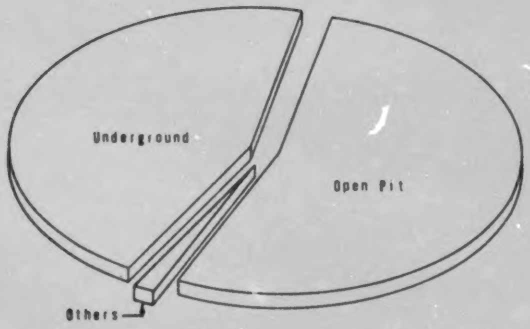
Uranium Concentrate Production - 1974

State	Tons of U_3O_8
New Mexico	4,900
Wyoming	3,800
Others (Colo., Texas, Utah, & Wash.)	2,800
Total-	11,500[1/]

1/ Includes 200 tons of U_3O_8 from mine waters, heap leaching, and miscellaneous materials.

(Source 25)

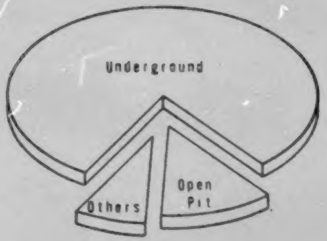
Distribution of 1973 U_3O_8 Production in Ore by Open Pit vs. Underground Mine



Source	Tons U_3O_8	% of Total
Underground Mines	4,974	36.08
Open Pit Mines	8,614	62.48
Others: Heap Leach, Mine Water In-Situ, Low Grade Stockpiles	199	1.44
Totals	13,787	100.00

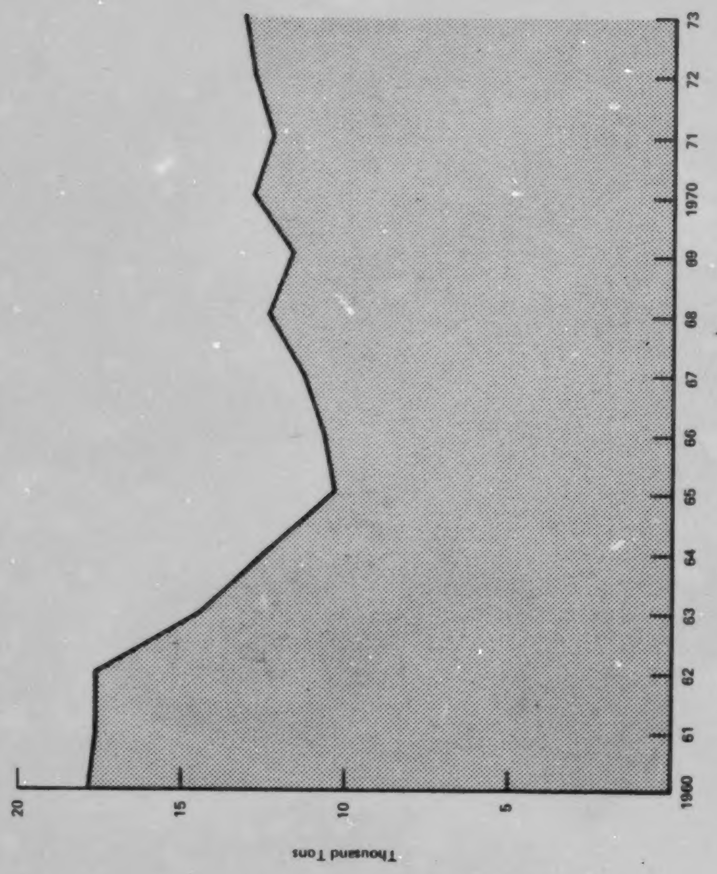
Distribution of Production Sources 1973

Source	No.	% Total
Underground	122	69.71
Open Pit	33	18.86
Others	20	11.43
Totals	175	100.00



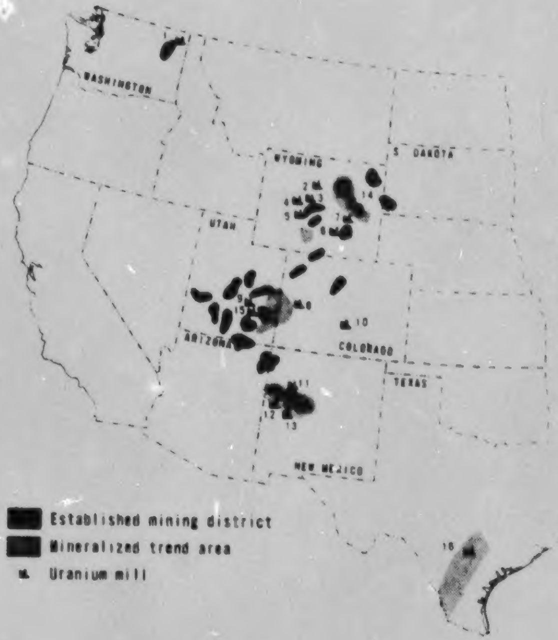
(Source 17)

U.S. Mill Production, Uranium Oxide (U_3O_8), 1960-73



(Source 24)

URANIUM MINING DISTRICTS


WASHINGTON
WYOMING
S DAKOTA
UTAH
ARIZONA
COLORADO
TEXAS
NEW MEXICO
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Established mining district
Mineralized trend area
Uranium mill

MILLS

1 DAWN MINING
2 UNION CARBIDE - WYOMING
3 UTAH INT. - GAS HILLS
4 FEDERAL-AMERICAN PARTNERS
5 WESTERN NUCLEAR
6 PETROTOMICS
7 UTAH INT. - SHIRLEY BASIN
8 UNION CARBIDE - URAVAN
9 ATLAS
10 COTTER
11 KERR-McGEE NUCLEAR
12 ANACONDA
13 UNITED NUCLEAR-HOMESTAKE PARTNERS
14 EXXON, WYOMING
15 RIO ALGOM
16 CONOCO PIONEER

(Source 24)

PRODUCING U. S. URANIUM MINES - 1/1/75

Ore Production Tons Ore Per Day	Number of Mines
2,000 - 4,000	3
1,000 - 2,000	4
500 - 1,000	6
100 - 500	24
less than 100*	77 +

---

*Mines producing less than 100 tons of ore per day contributed less than 5 percent of total 1974 production.

(Source 24)

EXPLORATION/MINING/MILLING FACTORS
ASSOCIATED WITH MEETING CONTRACTED REQUIREMENTS FOR THE OPERATING PLAN (1975 THROUGH 1985)
(PRODUCTION FROM RESOURCES ESTIMATED 1/1/75 TO BE PRODUCIBLE AT $"8"/LB. OR LESS U_3O_8)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	Total
Exploration (Including 8-Year Forward Reserves)												
Number rigs	170-250	250-330	300-370	250-330	300-370	300-370	300-370	300-370	300-370	250-330	250-330	
Feet of drilling (Millions)	20-25	30-40	35-45	30-40	35-45	35-45	35-45	35-45	35-45	30-40	30-40	350-455
Mines*	37	43	54	73	96	114	125	120	120	120	120	
Mills	14	14	14	16	20	26	30	30	30	30	30	
Manpower (Manshifts)	6,000	8,000	10,000	14,000	18,000	21,000	22,000	22,000	22,000	22,000	22,000	
Costs ($ Millions)												
Capital Costs	170	225	265	265	290	295	310	325	335	315	315	3,110
Operating Costs	85	115	140	200	250	320	350	335	335	335	335	2,800
Total Costs	225	340	405	465	540	615	660	660	670	650	650	5,910

* Includes only mines producing over 100 tons ore per day.

(Source 24)

EXPLORATION/MINING/MILLING FACTORS

ASSOCIATED WITH PRODUCTION TO FILL CONTRACTED REQUIREMENTS,

OPERATING PLAN THROUGH 1982, AND CASE A GROWTH REQUIREMENTS (.30% TAILS ASSAY) FOR 1983 THROUGH 1985

PRODUCTION FROM RESOURCE ESTIMATED 1/1/75 TO BE PRODUCIBLE AT $"8"/LB. OR LESS U_3O_8

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	Total
Exploration (Including 8-Year Forward Reserves)												
Number rigs	250-330	330-415	460-580	500-630	670-830	710-880	750-920	830-1,010	880-1,080	920-1,170	960-1,210	
Feet of drilling (Millions)	30-40	40-50	55-70	60-75	80-100	85-105	90-110	100-125	105-130	110-140	115-145	870-1,080
Mines*	37	43	54	73	96	116	125	125	137	167	186	
Mills	14	14	15	16	20	26	30	30	34	42	46	
Manpower (Manshifts)	6,000	8,000	10,000	14,000	18,000	21,000	22,000	24,000	25,000	31,000	34,000	
Costs ($ Millions)												
Capital Costs	255	350	415	425	435	455	485	580	605	800	835	5,640
Operating Costs	85	115	140	200	250	320	350	360	385	445	490	3,140
Total Costs	340	465	555	625	685	775	835	940	990	1,245	1,325	8,780

* Includes only mines producing over 100 tons ore per day.

(Source 24)

COMPARISON BETWEEN PRODUCTION FROM $8 CUTOFF COST AND
$15 CUTOFF COST RESOURCES TO MEET 1981 REQUIREMENTS

Cost Cutoff	Tons of U_3O_8	Tons of Ore	Average Grade % U_3O_8	Mill Recovery (Percent)
$8/lb. U_3O_8	42,900	20,000,000	0.224	95.6
$15/lb. U_3O_8	42,900	35,000,000	0.131	93.1

Figure 12

(Source 24)

COMPARISON OF AVERAGE MILL
SIZES AND PRODUCTION RATES
$8 RESOURCES VS. $15 RESOURCES

	Cost Cutoff $8/lb. U_3O_8 or Less	Cost Cutoff $15/lb. U_3O_8 or Less
Operating Mills		
Average TPD fed to process	1,700	3,300*
Average annual production, tons U_3O_8	1,250	1,400
New Mills		
Average TPD fed to process	1,500	3,500**
Average annual production, tons U_3O_8	1,300	1,500

---

* After mill expansion.

** Not all new mills would be in full production by 1985.

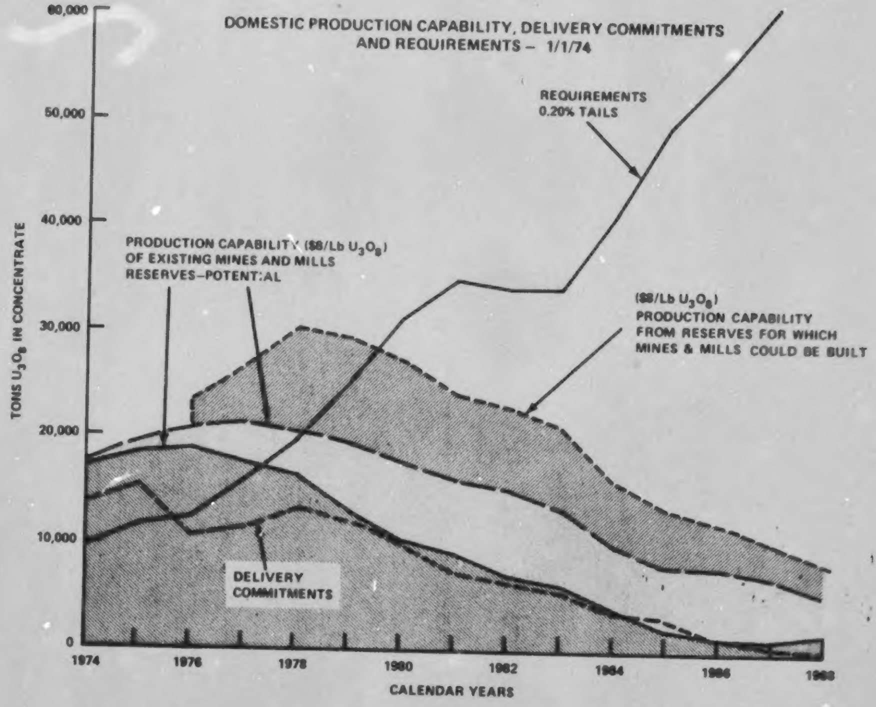
(Source 24)

SUMMARY OF EXPLORATION/MINING/MILLING FACTORS ASSOCIATED WITH PRODUCTION FOR THREE SITUATIONS

	Contract Requirements Operating Plan 1975 Through 1985. $8 Resources	Contract Requirements 1975 Through 1982. Case A - .3 Tails Assay 1983 Through 1985. $8 Resources	Contract Requirements 1975 Through 1982. Case A - .3 Tails Assay 1983 Through 1985. Transition $8 to $15 Resources
Exploration			
Rigs - additional	70-140	730-980	690-940
Total footage during period (millions of feet)	350-455	870-1,080	785-985
Mines - Additional	83	149	174
Mills - Additional	16	32	37
Manpower - Additional	16,000	28,000	39,000
Total Costs during period ($ millions)			
Capital	3,110	5,640	5,745
Operating	2,800	3,140	4,270
Total Costs	5,910	8,780	10,015

UNITED STATES DEMAND

(Source 15)


DOMESTIC PRODUCTION CAPABILITY, DELIVERY COMMITMENTS
AND REQUIREMENTS – 1/1/74
TONS U_3O_8 IN CONCENTRATE
60,000
50,000
40,000
30,000
20,000
10,000
0
1974
1976
1978
1980
1982
1984
1986
1988
CALENDAR YEARS
REQUIREMENTS
0.20% TAILS
PRODUCTION CAPABILITY ($8/Lb U_3O_8)
OF EXISTING MINES AND MILLS
RESERVES–POTENTIAL
($8/Lb U_3O_8)
PRODUCTION CAPABILITY
FROM RESERVES FOR WHICH
MINES & MILLS COULD BE BUILT
DELIVERY
COMMITMENTS

(Source 15)

Forecast of Domestic Uranium Requirements [1]

(Tons of U_3O_8)

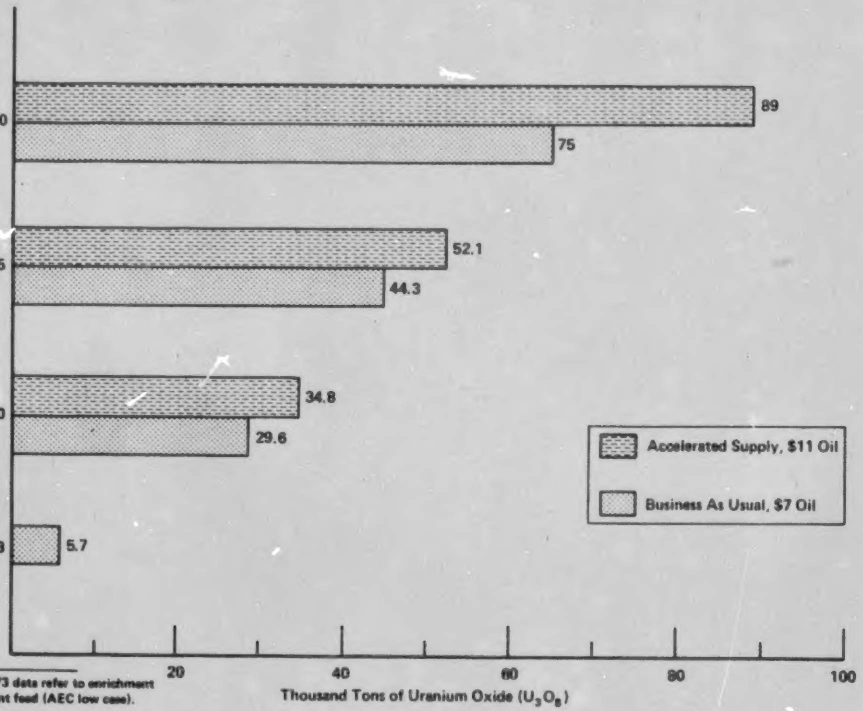
Year of U_3O_8 Delivery	Annual	Cumulative
1974	9,700	9,700
1975	11,700	21,400
1976	12,600	34,000
1977	16,000	50,000
1978	19,800	69,800
1979	25,200	95,000
1980	31,500	126,500
1981	35,000	161,500
1982	34,300	195,800
1983	34,400	230,200
1984	41,500	271,700
1985	49,800	321,500

---

[1] 0.20 percent U-235 GDP Tails, Case D - WASH-1139-(74) - Nuclear Power Growth, 1974-2000.

(Source 17)

Projected U.S. Uranium Oxide Requirements, 1973-90[1]

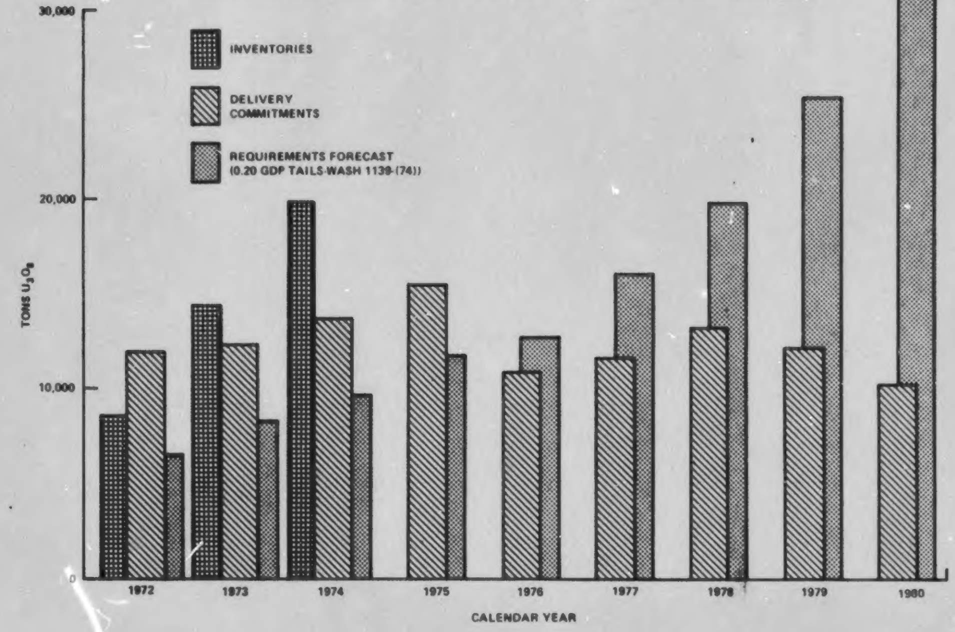


---

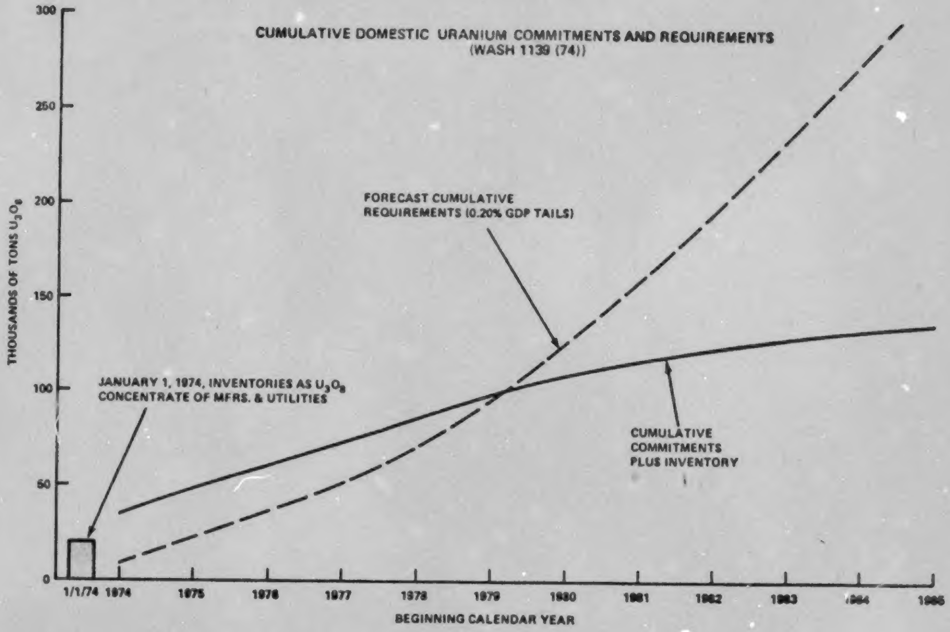
[1] 1973 data refer to enrichment plant feed (AEC low case).

(Source 15)

ANNUAL DOMESTIC URANIUM DELIVERY COMMITMENTS, REQUIREMENTS AND INVENTORIES



(Source 15)



CUMULATIVE DOMESTIC URANIUM COMMITMENTS AND REQUIREMENTS
(WASH 1139 (74))

(Source 15)

Reported Unfilled Requirements, Delivery Commitments, Potential Deliveries and Requirements

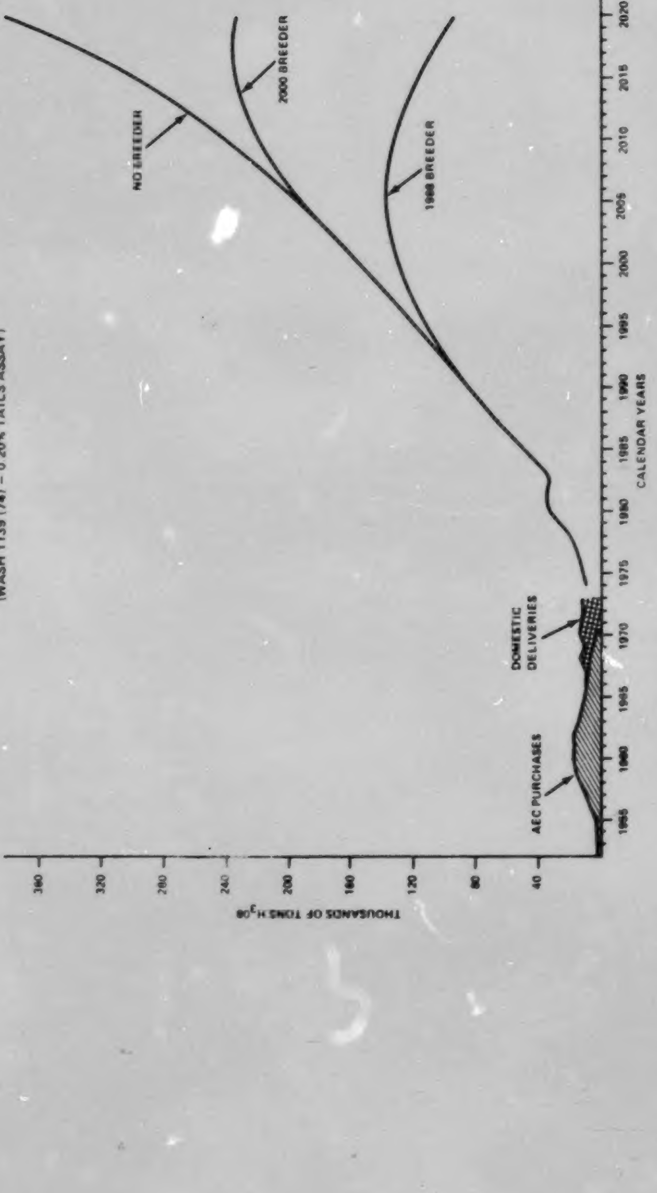
(Tons of U_3O_8)

	(1)	(2)	(3)	(4)
Calendar Years	Reported Unfilled Requirements	Delivery Commitments	Potential Deliveries (Unfilled Requirements) Plus Delivery Commitments	Requirements
1974	100	13,700	13,800	9,700
1975	200	15,500	15,700	11,700
1976	600	10,900	11,500	12,600
1977	1,500	11,600	13,100	16,000
1978	5,100	13,200	18,300	19,800
1979	9,300	12,100	21,400	25,200
1980	15,300	10,200	25,500	31,500
Totals	32,100	87,200	119,300	126,500

NOTE: Columns (1), (2), and (3) contain data gathered in the survey and column (4) are requirements forecast by AEC.

(Source 22)

PROJECTED ANNUAL DOMESTIC REQUIREMENTS
FOR 1988, 2000 AND NO BREEDER REACTORS
(WASH 1139 (74) – 0.20% TAILS ASSAY)



(Source 15)

Uranium Delivery Commitments
Domestic Producers to Domestic Buyers
(Tons of U_3O_8)
As of January 1, 1974

Year of U_3O_8 Delivery	Annual	Cumulative
1966-1972	--	43,500
1973	12,100	55,600
1974	13,700	69,300
1975	15,500	84,800
1976	10,900	95,700
1977	11,600	107,300
1978	13,200	120,500
1979	12,100	132,600
1980	10,200	142,800
1981	7,700	150,500
1982	6,600	157,100
1983	5,900	163,000
1984	4,000	167,000
1985	3,400	170,000
1986	1,700	172,100
1987-1994	<1,000/yr.	175,600

Commitments to foreign buyers totaled an additional 6,700 tons of U_3O_8 of which 5500 tons were delivered prior to January 1, 1974.

(Source 20)

AVERAGE U_3O_8 PRICES, PURCHASE CONTRACTS AS OF 7/1/74

Calendar Years	Average Price/lb (Current Dollars)	% of Commitments For Which Prices Were Reported	Delivery Commitments (Tons U_3O_8)	Requirements[1/] (Tons U_3O_8 0.20% Tails)
1974	7.65	89	12,800	9.700
1975	7.85	95	18,200	11,700
1976	8.60	95	12,600	12,600
1977	9.25	91	14,600	16,000
1978	9.60	92	15,400	19,800
1979	10.50	89	14,100	25,200
1980	11.40	94	14,600	31,500

[1/] AEC Report, WASH-1139(74) Case D.

The above uranium prices are weighted averages. The data covered from 89 to 95 percent of the individual year's deliveries. It should be noted that the prices shown are for purchase contracts made during the years 1967 through mid-1974, and the quantities involved represent only a fraction of projected requirements in the last half of the decade. These prices are not intended to represent those at which uranium may be purchased now or in the future, and are not expected to be representative of the average prices which will be paid for the total quantity purchased for delivery, particularly during the later years. The trend in prices is up substantially and recently published prices for new uranium purchase commitments indicate this trend may continue.

Purchase commitments reported as of July 1, 1974 were 102,300 tons of U_3O_8 for delivery during this period, an increase of 17 percent over the 87,200 reported as of 1/1/74 /WASH-1196(74)/. Data were provided by all five reactor manufacturers and 31 of the 37 utilities surveyed. Although this survey was not complete, the price data provided covered 94,600 tons of U_3O_8 or 92 percent of the total tons contracted to be delivered. This is an increase of 8 percent over the coverage in the 1973 survey. A comparison of purchase commitments over this period as of 7/1/74 with those obtained from the fuel supply survey as of 1/1/74 follows:

(Source 20)

URANIUM DELIVERY COMMITMENTS

Calendar Years	Tons U_3O_8		
	As of 7/1/74	As of 1/1/74	Difference
1974	12,800	13,700	(900)
1975	18,200	15,500	2,700
1976	12,600	10,900	1,700
1977	14,600	11,600	3,000
1978	15,400	13,200	2,200
1979	14,100	12,100	2,000
1980	14,600	10,200	4,400
Totals	102,300	87,200	15,100

(Source 15)

Outstanding Invitations to Bid on Uranium Supply

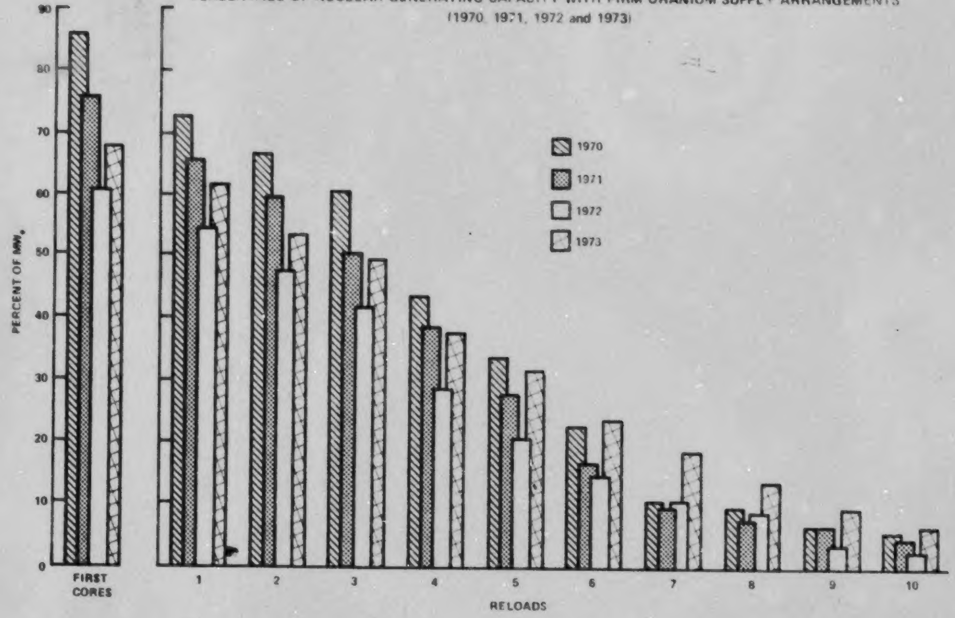
(Tons of U_3O_8)

As of January 1, 1974

Year of U_3O_8 Delivery	Annual	Cumulative
1979	800	800
1980	600	1,400
1981	1,600	3,000
1982	2,300	5,300
1983	2,000	7,300
1984	3,100	10,400
1985	3,400	13,800
1986	4,000	17,800
1987	4,000	21,800
1988	4,000	25,800
1989	3,900	29,700
1990	3,900	33,600
1991	1,900	35,500
1992	1,900	37,400
1993	1,900	39,300
1994-1996	< 1,000/yr.	40,400

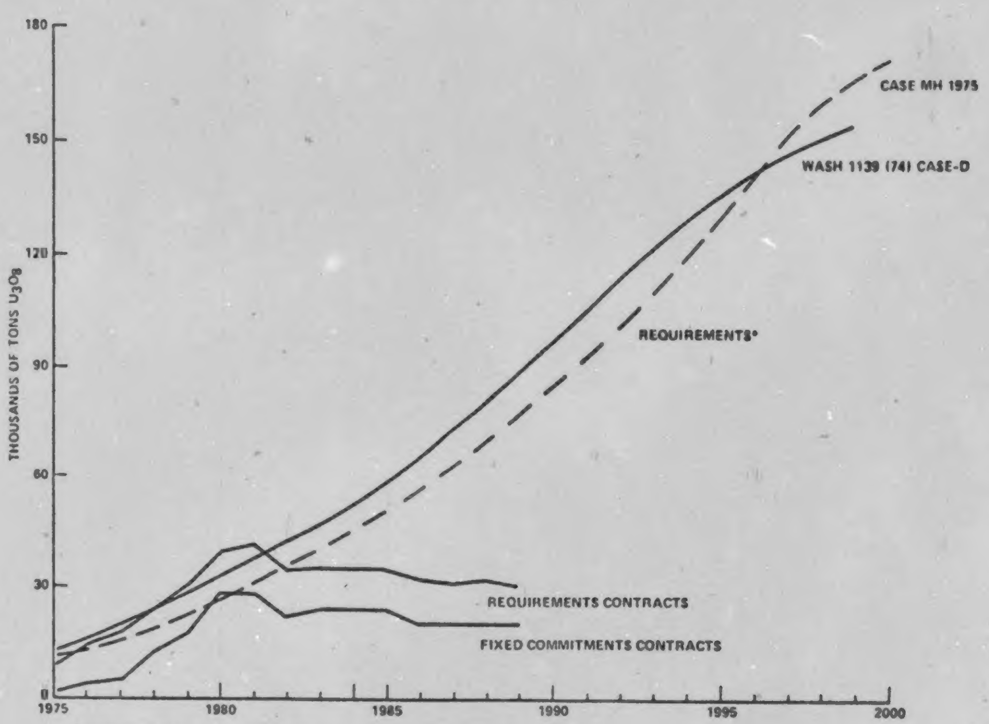
(Source 15)

PERCENTAGE OF NUCLEAR GENERATING CAPACITY WITH FIRM URANIUM SUPPLY ARRANGEMENTS
(1970, 1971, 1972 and 1973)



(Source 14)

URANIUM REQUIREMENTS FOR NUCLEAR POWER



*ENRICHMENT TAILS - 0.20 THRU FY 1976; 0.275 FY 1977-FY 1981; 0.30 AFTER

DRILLING

(Source 13)

SURFACE DRILLING

Companies active in the uranium industry reported surface exploration and development drilling totaling 22 million feet during 1974, comprising 16 million feet of exploration drilling and 6 million feet of development drilling. These figures do not include approximately one million feet of underground drilling for control of mining operations. The 22 million feet of exploration and development drilling in 1974 compares with 16.4 million feet drilled during 1973.

Exploration drilling involves the search for new deposits and determination whether or not a discovery is commercially attractive. Development drilling is done subsequently to determine in detail the size, configuration, and grade of the deposits.

The first of the two following tables gives the number of surface holes, average depth of holes and the total footage drilled each year since 1966. The second table is a summary of the total 1974 drilling by states.

(Source 13)

SURFACE DRILLING DATA

Year	Number of Holes	Average Depth (Feet)	Total Footage (Millions)
1966	18,900	220	4.2
1967	29,700	360	10.8
1968	58,000	410	23.8
1969	75,900	390	29.9
1970	58,900	400	23.5
1971	38,900	400	15.5
1972	36,600	420	15.4
1973	34,300	480	16.4
1974	39,700	540	22

The 39,700 surface holes completed in 1974 were drilled by 82 companies using an estimated 230 drill rigs.

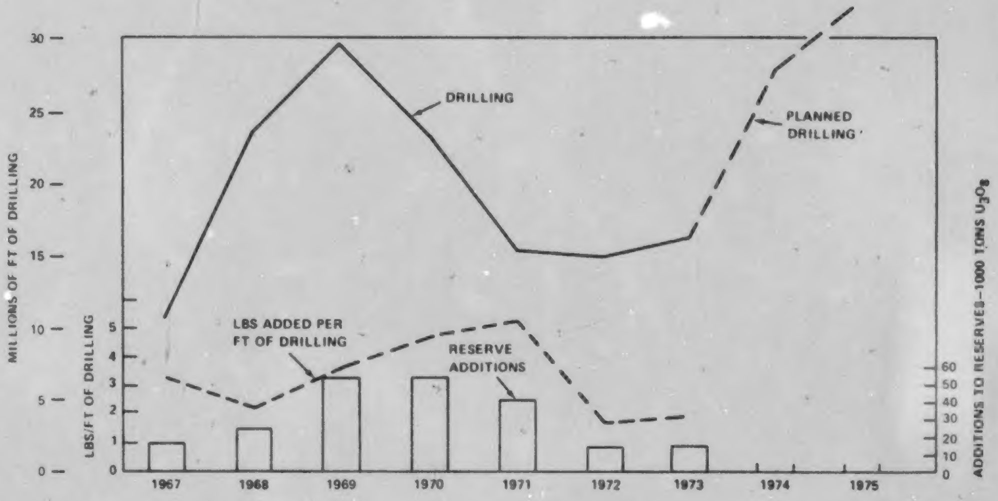
1974 Surface Drilling by States

(Exploration and Development)

State	Total Footage Rounded (Millions)	Approx. % of Total
Wyoming	11	50
New Mexico	5	23
Texas	3	14
Colorado	1	4
Montana	1	4
Others (Ariz., Calif., Idaho, Ore., Nev., N.D., S.D., Utah, Wash., & Eastern U.S.)	1	5
Total	22	100

(Source 22)

DRILLING, RESERVE ADDITIONS, AND DISCOVERY RATES AT $8/LB U_3O_8



GENERAL GLOSSARY

Accelerated Supply Strategy. (Accelerated Development) The Federal Government takes actions to increase the domestic supply of energy including accelerated Federal leasing of the Outer Continental Shelf; opening the Naval Petroleum Reserves to commercial exploration and development; and removing regulatory constraints (see Project Independence Report).

Acre-foot. A quantity of water that would cover 1 acre, 1 foot deep. Contains 43,560 cubic feet, 1,233 cubic meters, 325,900 gallons (U.S.). One acre-foot of water can satisfy the municipal and industrial demands of 201 people for 1 year.

AGA. American Gas Association. The trade association of the private gas industry.

Alternating Current (AC). An electric current whose direction is reversed at regular intervals. Electric power in the United States alternates with a frequency of 60 hertz, or cycles per second. Some European countries use 50 hertz.

Ampere. A unit of measure for an electric current; the amount of current which flows in a circuit in which the electromotive force is one volt and the resistance is one ohm.

Animal Waste Conversion. The process for obtaining oil from animal wastes. A Bureau of Mines experiment has obtained 80 gallons of oil per ton from cow manure. In comparison, average oil shale yields 25 gallons of oil per ton of ore.

Anthracite. A hard, black, lustrous coal that burns efficiently and is therefore valued for its heating quality.

API. American Petroleum Institute. A trade association of the American petroleum industry.

Ash. Noncombustible mineral matter contained in coal. These minerals are generally similar to ordinary sand, silt and clay in chemical and physical properties.

Associated-dissolved Gas. Associated gas is free natural gas in immediate contact, but not in solution, with crude oil in the reservoir; dissolved gas is natural gas in solution in crude oil in the reservoir.

ATGAS. A process for coal gasification being developed for the Department of the Interior by Applied Technology Inc. The primary feature of the process is dissolving of coal in a bath of molten iron.

Atomic Energy. The energy released by a nuclear reaction or by radioactive decay. (See radioactivity, fission, fusion, nuclear reactors).

Average Life (mean life). The average of the individual lives of all the atoms of a particular radioactive substance. It is 1.443 times the radioactive half-life of the substance.

Autofining. A fixed-bed catalytic process for desulfurizing distillates.

Backup. Reserve generating capacity of a power system.

Barrel (bbl) A liquid measure of oil, usually crude oil, equals to 42 American gallons or about 306 pounds. One barrel equals 5.6 cubic feet or 0.159 cubic meters. For crude oil 1 bbl is about 0.136 metric tons, 0.134 long tons, and 0.150 short tons. The energy values of petroleum products per barrel are: crude petroleum 5.6 million Btu/bbl; residual fuel oil—6.29; distillate fuel oil—5.83; gasoline—5.25; jet fuel (kerosine type)—5.67; jet fuel (naphtha type)—5.36; kerosine—5.67; petroleum coke—6.02; and asphalt—6.64.

Base Load. The minimum load of a utility (electric or gas) over a given period of time.

Base Load Station (Gas). A station which is normally operated to take all or part of the base load of a system and which, consequently, operates essentially at a high load factor.

Base Production Control Level. The total number of barrels of domestic crude petroleum produced from a particular property in the corresponding month of 1972.

Bbl/d. Barrels per day.

Bbls. Barrels.

Bender Process. A continuous, fixed-bed chemical treating process, using a lead sulfide catalyst for sweetening light distillates. The process converts mercaptans to disulfides by oxidation.

Benzene. C6H6. A colorless liquid hydrocarbon, made from coal tar and by catalytic reforming of naphthenes. It is used in the manufacture of phenol, styrene, nylon, detergents, aniline, phthalic anhydride and other compounds; as a solvent; and as a component of high-octane gasoline.

Benzin. A refined light naphtha used for extraction purposes.

Benzine. An obsolete term for light petroleum distillates covering the gasoline and naphtha range.

Bi-Gas. A process for coal gasification being developed by the Office of Coal Research and the American Gas Association.

Bitumen. A general name for various solid and semisolid hydrocarbons; a native substance of dark color, comparatively hard and nonvolatile, composed principally of hydrocarbon.

Bituminous Coal. Soft coal; coal that is high in carbonaceous and volatile matter. When volatile matter is removed from bituminous coal by heating in the absence of air, the coal becomes coke.

Blended Fuel Oil. A mixture of residual and distillate fuel oils.

Blending Naphtha. A distillate used to thin heavy stocks to facilitate processing, e.g. to thin lubricating oil in dewaxing processes.

Blending Stock. Any of the stocks used to make commercial gasoline. These include: natural gasoline, straight-run gasoline, cracked gasoline, polymer gasoline, alkylate, and aromatics.

Boiling Water Reactor (BWR). A nuclear reactor in which water, used as both coolant and moderator, is allowed to boil in the reactor core. The resulting steam can be used directly to drive a turbine.

B.M. Bureau of Mines, U.S. Department of the Interior.

Bottoming Cycle. A means to increase the thermal efficiency of a steam electric generating system by converting some waste heat from the condenser into electricity rather than discharging all of it to the environment.

Breeder Ratio. The ratio of the number of fissionable atoms produced in a breeder reactor to the number of fissionable atoms consumed in the reactor.

Breeder Reactor. A nuclear reactor so designed that it converts more uranium-238 or thorium into useful nuclear fuel than the uranium-235 or plutonium which it uses. The new fissionable materials are created by capture in the fertile materials of neutrons from the fission process. There are three types of breeder reactors: the liquid metal, fast breeder (LMFBR); the gas cooled fast breeder (GCBR); and the molten salt breeder (MSBR).

Breeding Ratio. The number of new fission atoms produced in a breeder reactor per fissionable atom consumed in the reactor.

British Thermal Unit (BTU). The quantity of heat necessary to raise the temperature of one pound of water one degree Fahrenheit. One Btu equals 252 calories, gram (mean), 778 foot-pounds, 1055 joules and 0.293 watt-hours.

Btu. British thermal units per hour. A measure of rate of heat.

Bulk Plant. A wholesale distributing unit for petroleum products, often having facilities on railroad sidings. It may have tank storage for light oils and a warehouse with storage for products sold in barrels and packages.

Bulk Plants for LP Gas. A distributing point with permanently installed pressure tanks and required accessory equipment for storing large volumes of liquid petroleum gas and, in dealers plants, withdrawing if for refilling bottles, delivery trucks and trailers; in consumer's plants, withdrawing if for vaporization and utilization.

Bunker "C" Fuel Oil. A heavy residual fuel oil used by ships, industry, and for large-scale heating installations. In industry it is often referred to as No. 6 fuel.

Burn-UP (Nuclear). A measure of the consumption of nuclear fuel in a nuclear reactor. Fuel burn-up may be expressed in terms of total energy extracted from the fuel during its stay in the reactor, in terms of percentage of the fuel consumed over that period. For the former, the units usually are megawatt-days of heat per metric ton. (MWD/tonne). One percent burn-up is about 9,000 MWD/tonne.

Bureau of Mines (BoM). A bureau of the Department of Interior established in 1910. The bureau ". . . conducts research and administers regulatory programs necessary for performance of the governmental function to stimulate the private sector toward the production of an appropriate and substantial share of the national mineral and fuel needs in a manner that best protests the public interest."

Busbar. An electrical conductor in the form of rigid bars located in a switchyard or power plants, serving as a common connection for two or more electrical circuits.

Business as usual strategy. Existing policies continue and only limited new actions are considered (see Project Independence Report).

By-product (*Residuals*). Secondary products which have commercial value and are obtained from the processing of raw material. They may be the residues of the gas production process, such as coke, tar, and ammonia, or they may be the result of further processing of such residues, such as ammonium sulphate.

By-product material (*Nuclear*). Any artificial radioactive material obtained during the production or use of source material or fissionable material. It includes fission products and radioisotopes produced in nuclear reactors, but not radioactive materials occuring in nature or those made with accelerators such as cyclotrons.

Caking Coal. Coal which softens and agglomerates on heating and, after volatile matter has been driven off at high temperatures, produces a hard gray cellular mass of coke. All caking coals are not good coking coals.

Calorie. A unit of heat energy equal to the amount of heat that will raise the temperature of one gram of water 1 degree centigrade. (cal.) The calorie is used when temperature is measured on the Centigrade scale, while the British thermal unit is used when the measurement is on the Fahrenheit scale. One calorie equals 3.97×10^{3} Btu, 4.18 joules, and 1.10×10^{9} watt-hours. For energy issues, the usual term is the kilocalorie, or 1000 calories.

Calorific Value. The heat liberated by the combustion of a unit quanity of a fuel.

Capacity. The maximum power output or load for which a machine, apparatus, station, or system is rated.

Capacity Factor. The ratio of the amount of electricity produced by a plant or system to its maximum theoretical productive capacity.

Cash Bonus Payment. A cash consideration paid by the lessee for the execution of an oil or gas lease by a landowner. The bonus is usually computed on a per acre basis.

Catalytic Cracking. The conversion of high-boiling hydrocarbons into lower boiling substances by means of a catalyst. Feedstocks may range from naphtha cuts to reduced crude oils.

Catalytic Hydrogenation of Coal Tar. A process being developed by the Bureau of Mines to convert sulfur-bearing coal into non-polluting fuel.

Catalytic Reforming. The rearranging of hydrocarbon molecules in a gasoline-boiling-range feedstock to produce other hydrocarbons having a higher antiknock quality.

Ccf. One hundred cubic feet. A unit of measure used for small amounts of natural gas.

Ceiling Price. The maximum permissible selling price for a particular grade of domestic crude petroleum in a particular field is the May 15, 1973, posted price plus $1.35 per barrel.

CEQ. Council on Environmental Quality.

Cf. Cubic feet.

Cfh. Cubic feet per hour.

Cfm. Cubic feet per minute.

Cfs. Cubic feet per second.

Chain Reaction. A nuclear reaction that stimulates its own repetition. In a fission chain reaction, a fissionable nucleus absorbs a neutron and fissions, releasing additional neutrons. These in turn can be absorbed by other fissionable nuclei, releasing still more neutrons. A fission chain reaction is self-sustaining when the number of neutrons released equals or exceeds the number of neutrons lost by absorption in nonfissionable material or by escape from the system.

Char-oil Process (*COED*). A process being developed by the Office of Coal Research for low-temperature distillation of coal carbonization products. The process is designed to produce clean liquids, gases and char for fuel, with the product balance depending upon economic factors.

CO_2-Acceptor Process. A process being developed by the Office of Coal Research and the American Gas Association to gasify lignite. Commercial application could provide a clean synthetic gas, or low-sulfur solid fuel for power generation.

Coal Alkylation. A process being developed by the Bureau of Mines to convert sulfur-bearing coal into a non-polluting fuel.

Coal Augering. A surface mining method used when coal lies in high walls that were prepared for this operation or were left by stripping, or when the coal outcrops to the surface. The mining machines consist of large single and double augers which drill horizontally into the seams to extract the coal.

Coal Classification Systems. In all countries the basis for classification is content of volatile matter. Anthracite is 10% volatile; lean coal, semi-anthracite or dry-steam coal is 10–13% volatile; variously designed coal is 14–20% volatile; coking coal is 20–30% volatile.

Coal Gas. Manufactured gas made by distillation or carbonization of coal in a closed coal gas retort, coke oven, or other vessel.

Coal Gasification. The conversion of coal (a solid) to a gas which is suitable for use as a fuel. The gas produced may be either a high-Btu or a low-Btu fuel. High-Btu gas is similar to natural gas and will range in energy content from 900 to 1,000 Btu per cubic foot. Low-Btu gas may range as low as 200 Btu per cubic foot.

Coal Liquefaction. (Coal Hydrogenation) The conversion of coal into liquid hydrocarbons and related compounds by hydrogenation.

Coal oil. Oil obtained by the destructive distillation of bituminous coal. An archaic term for kerosine made from petroleum.

Coal Preparation. A collective term for physical and mechanical processes applied to coal to make it suitable for a particular use.

Coal Slurry Pipeline. A pipeline which transports coal in pulverized form suspended in water.

Coal Tar. A gummy, black substance produced as a byproduct when bituminous coal is distilled.

Coastwise Shipping. Goods shipped from one U.S. port to another U.S. port along the same coastal region.

COED. An Office of Coal Research project for development of liquid fuel from coal char.

Coke. A porous, solid residue resulting from the incomplete combustion of coal heated in a closed chamber, or oven, with a limited supply of air. Coke is largely carbon and is a desirable fuel in certain metallurgical industries.

Coking Coal. The most important of the bituminous coals, which burns with a long yellow flame and creates an intense heat when properly attended.

Combination Utility. Utility which supplies both a gas and some other utility service (electricity, water, traction, etc.).

Combined-cycle Plant. A plant which utilizes waste heat from large gas turbines (driven by gases from combustion of hydrocarbon fuels) to generate steam for conventional steam turbines.

Condensate. Liquid hydrocarbon obtained by the combustion of a vapor or gas produced from oil or gas wells and ordinarily separated at a field separator and run as crude oil.

Conservation Strategy. The Federal Government takes actions necessary to reduce demand for energy, particularly petroleum, including perhaps setting of minimum mileage standards for new automobiles, and provision of incentives and standards to increase residential insulation and energy-use efficiency (see Project Independence Report).

Containment (Nuclear). A gas-tight shell or other enclosure around a nuclear reactor to contain radioactive vapors and gases that might otherwise be released to the atmosphere in a reactor accident.

Continental Shelf. The extension of the continental land mass into the oceans, under relatively shallow seas, as opposed to the deeper basins.

Conventional gas. Natural gas as contrasted to synthetic gas.

Controlled Crude Oil. Domestically produced crude petroleum that is subject to the ceiling price for crude oil. For a particular property which is not a stripper well lease, the volume of controlled oil equals the base production control level minus an amount of released oil equal to the new oil production from that property.

Conventional oil. Crude oil and condensate as contrasted with synthetic oil from shale or coal.

Conversion. The chemical processing of uranium concentrates into uranium hexafluoride gas.

Conversion factors. The energy content of most fuels can vary depending on their source and composition. The following energy equivalents are among those commonly used.

Coal:

Anthracite=26.0 million Btu/ton.
Bituminous=24.8 million Btu/ton.
Sub-bituminous=19.0 million Btu/ton.
Lignite=13.4 million Btu/ton.

The average heating value of bituminous coal and lignite exported and used in electricity generation and in industry in 1969 in the United States was 24.7 million Btu/ton.

Petroleum:

Crude petroleum—5.60 million Btu/bbl (42 gal).
Residual Fuel Oil—6.29 million Btu/bbl.
Distillate Fuel Oil—5.83 million Btu/bbl.
Gasoline (including aviation)—5.25 million Btu/bbl.
Jet Fuel (kerosene type)—5.67 million Btu/bbl.
Jet Fuel (naphtha-type)—5.36 million Btu/bbl.
Kerosene—5.67 million Btu/bbl.
Asphalt and Road Oil—6.64 million Btu/bbl.

Natural Gas:

Dry—1031 Btu/cu. ft. at STP.
Wet—1103 Btu/cu. ft. at STP.
Liquids (avg)—4.1 million Btu/bbl.

Fissionable Material—74 million Btu/gm U-235 fissioned.

Converter Reactor. A nuclear reactor that produces some fissionable materials from uranium-238 or thorium, but less than the nuclear material it consumes. Light water reactors and high temperature gas cooled reactors are converters.

Coolant. A substance circulated through a nuclear reactor to remove or transfer heat. Common coolants include water, air, carbon-dioxide, helium and liquid sodium.

Cooling pond. An artificial pond used to receive and dissipate waste heat, usually from a steam-electric power plant. Approximately an acre of pond surface is needed per megawatt of electric output for a modern steam-electric power plant.

Cooling Tower, Wet. A unit or structure, usually built of wood, for the cooling of water by evaporation.

Cooling Tower, Dry. A unit or structure for cooling water by conduction and convection into the air, much as does the radiator of an automobile.

Core. The central part of a nuclear reactor which contains the nuclear fuel.

Cps. Cycles per second.

Cracking. Processing that breaks down and rearranges the molecular structure of hydrocarbon chains. In thermal cracking, high temperature and high pressure is applied; in catalytic cracking, temperature and pressure are applied in the presence of a catalyst.

Cracking Plant. An oil refinery.

Cracking Still. The combined equipment—furnace, reaction chamber, fractionator—for the thermal conversion of heavier charging stock to gasoline.

Crude. Oil in its natural state, before refining or processing.

Crude Naphtha. Light distillate made in the fractionation of crude oil.

Crude Oil. A mixture of hydrocarbons that existed in natural underground reservoirs. It is liquid at atmospheric pressure after passing through surface separating processes and does not include natural gas products. It includes the initial liquid hydrocarbons produced from tar sands, gilsonite, and oil shale.

Crude Oil Domestic Production. The volume of crude oil flowing out of the ground. Domestic production is measured at the wellhead and includes lease condensate, which is a natural gas liquid recovered from lease separators or field facilities.

Crude Oil Imports. The monthly volume of crude oil imported which is reported by receiving refineries, including crude oil entering the U.S. through pipelines from Canada.

Crude Oil Stocks. Stocks held at refineries and at pipeline terminals. Does not include stocks held on leases (storage facilities adjacent to the wells), which historically total approximately 13 million barrels.

Cryogenics. The study and production of very low temperatures and their associated phenomena.

Cryogenic Techniques. Techniques involving extremely low temperatures used to keep certain fuels in liquid form; i.e. liquefied hydrogen, methane, propane, etc. CF. super conductivity.

CSF. Consol Synthetic Fuel

Cubic Foot (cu. ft.). The most common unit of measurement of gas volume. It is the amount of gas required to fill a volume of one cubic foot under stated conditions of temperature, pressure, and water vapor. One cubic foot equals 28317.01 cubic centimeters; 1,728 cubic inches; 7.48 gallons (U.S.); and 28.31 liters. One cubic foot/second equals 1.98 acre-feet/day; 448.8 gallons/minute; and 0.646 million gallons/day.

Cubic Meter. A measure of volume in the metric system. One cubic meter equals 8.6 barrels (U.S., liquids); 35.3 cubic feet; 1.3 cubic yards; 264.1 gallons (U.S.); and 999.9 liters.

Cubic Yard. A measure of volume. One cubic yard equals 27 cubic feet and 0.76 cubic meters.

Culm. In anthracite terminology, the waste accumulation of coal, bone and rock from old dry breakers.

Curie. The unit for radioactive quantity. One curie equals 3.7 x 10^{10} nuclear transformations per second. Common fractions are:

Megacurie: One million curies (MCi)
Microcurie: One millionth of a curie
Millicurie: One thousandth of a curie (mCi)
Nanocurie: One billionth of a curie (nCi)
Picocurie: One millionth of a microcurie (pCi)

CUP. Cascade Uprating Program.

DC. Direct Current.

Dead-Weight Tons (DWT). The total lifting capacity of a ship expressed in long tons (2,240 lbs.). For example, the oil tanker Universe Ireland is listed as 312,000 dwt. which means it can carry 312,000 tons of oil or about 1.9 million barrels.

Dealer Tankwagon (DTW) Price. The price at which a retail dealer purchases gasoline from a distributor or a jobber.

Decay, Radioactive. The process whereby atoms of radioactive substances experience transformation into atoms of other elements with attendant emission of penetrating radiations (gamma rays) and some nuclear particles. Each radioactive substance has a unique decay rate which may range from a fraction of a second to hundreds of years or more.

Decay Cooling. The storage of irradiated fuel elements to allow for radioactive decay of short-lived radioisotopes prior to initiating fuel reprocessing.

Decay Heat. The heat produced by radioactive decay of radioactive fission products in a nuclear core.

Decay Product. A nuclide resulting from the radioactive disintegration of a radio nuclide, formed either directly or as the result of successive transformations in a radioactive series. A decay product may be either radioactive or stable.

Deep Mining. The exploitation of coal or mineral deposits at depths exceeding about 1,000 feet. Coal is usually deep mined at not more than 1,500 feet. Mineral mines are deeper.

Degree Day, Cooling. A measure of the need for air conditioning (cooling based on temperature and humidity.) Although cooling degree days are published for many weather stations, specific procedure has not been generally accepted.

Degree Day, Heating. A measure of the coldness of the weather experienced, based on the extent to which the daily mean temperature falls below a reference temperature, usually 65 degrees F.

Deliverability. The volume of a gas well, field, pipeline, or distribution system can supply in a given period of time. Also, the practical output from a storage reservoir.

Demand. The rate at which electric energy is delivered to or by a system or to a piece of equipment, expressed in kilowatts, kilovolt amperes, or other suitable unit at a given instant or average over any designated time. Likewise the rate at which natural gas or other fuel is delivered to a system.

Demand, Average. The demand on a system or any of its parts over an interval of time, determined by dividing the total energy supplied by the number of units of time in the interval.

Demonstrated Coal Reserve Base. Measured and indicated in-place quantities of bituminous coal and anthracite located in beds 28 inches or more thick, and subbituminous coal in beds 60 or more inches thick which are located in depths up to 1,000 feet. The demonstrated coal reserve base includes also small quantities of coal located in beds thinner and/or deeper than coal presently mined, for which there is evidence that mining is commercially feasible at this time. The data for lignite include beds 60 inches or thicker that can be surface mined.

These are generally located at depths no greater than 120 feet. In general, the amount of coal that can be recovered from a deposit ranges from 40 to 90 percent of the reserve base.

Depleted Uranium. Uranium having less uranium-235 atoms than found in nature, which is 0.71 percent. Depleted uranium is a by-product of the enrichment process.

Depletion Allowance. A tax allowance extended to the owner of exhaustible resources based on an estimate of the permanent reduction in value caused by the removal of the resource.

Desulfurization. The process by which sulfur and sulfur compounds are removed from gases or liquid hydrocarbon mixtures.

Diesel Engine. An internal-combustion engine drawing its power from the explosions of an air-oil mixture. Combustion is caused by heat from compressing the air-fuel mixture in a cylinder by a piston.

Diesel Fuel. Fuel used for internal combustion on diesel engines; usually that fraction which distills after kerosene; similar to gas oil.

Dip. The angle at which coal beds, stratified rocks, or other planar features, such as faults, are inclined from the horizontal.

Direct Current (DC). Electricity that flows continuously in one direction, as contrasted with alternating current.

Direct Energy Conversion. The generation of electricity from an energy source in a manner that does not involve transference of energy to a working fluid. Direct conversion methods have no moving parts and usually produce direct current. Some methods include thermoelectric conversion, thermionic conversion and magnetohydrodynamic conversion.

Distillate Fuel Oil. The lighter fuel oils distilled off during the refining process. Included are products known as ASTM grades nos. 1 and 2 heating oils, diesel fuels, and no. 4 fuel oil. The major uses of distillate fuel oils include heating, fuel for on and off highway diesel engines, and railroad diesel fuel. Minor quantities of distillate fuel oils produced and/or held as stocks at natural gas processing plants are not included in this series.

Doubling Time. In the long-term (multi-cycle) operation of a breeder reactor system, the time required to achieve a net doubling of the inventory of fissionable material present in the system, expressed in years. Doubling time depends on the breeding gain and the specific power at which the reactor operates.

Domestic Non-controlled Crude Oil. That portion of domestic crude oil production including new, released, and stripper oil which may be sold at a price exceeding the ceiling price.

Dragline. A type of overburden stripping equipment that casts a steel cable hung bucket a considerable distance, collects the dug material by pulling the bucket toward itself with another cable, elevates the bucket, rotates and dumps the material on a spoil bank.

Drift. Water lost from an evaporative cooling tower as liquid droplets are entrained in the exhaust air.

Drift Mine. A coal mine which is entered directly through a horizontal opening.

Dry Cooling. Cooling in which waste heat is dissipated directly to the atmosphere.

Dry Hole. A drilled well which does not yield gas and/or oil in quantities or condition to support commercial production.

Efficiency, Thermal. Relating to heat, a percentage indicating the available Btu input that is converted to useful purposes. It is applied, generally, to combustion equipment.

$$E = \frac{\text{Btu output}}{\text{Btu input}}$$

EHV. Extra-high voltage.

Electricity Production. Production at electric utilities only. Does not include industrial electricity generation.

Electrofluidic Coal Processing. A system being developed by the Office of Coal Research to dissolve and hydrogassify coal. If successful it may provide a way to completely use coal fed to conversion processes and thus minimize environmental problems through waste products.

Energy. The capability of doing work. There are several forms of energy, including kinetic, potential, thermal, and electromagnetic. One form of energy may be changed to another, such as burning coal to produce steam to drive a turbine which produces electricity. Except for some hydroelectric and nuclear power, most of the world's energy comes from energy in the form of fossil fuels, which are burned to produce heat.

Energy Messages. Cf. The President's messages.

Enriched Uranium. Uranium in which the amount of uranium-235 present has been artificially increased above the 0.71 percent found in nature. Uranium enriched between 3 and 6 percent is a common fuel for civil nuclear power stations. Uranium enriched to 90 percent or more is used for nuclear propulsion of warships and submarines, and in atomic bombs.

Enriching (Gas). Increasing the heat content of gas by mixing it with a gas of higher Btu content.

Enrichment. A process by which the proportion of the fissionable uranium isotope (U–235) is increased above the 0.7 percent contained in natural uranium.

Enthalpy. The heat content per unit mass, expressed in Btu per pound.

Environmental Impact Statements. The analytical statements that balance costs and benefits of a Federal decision. Required by the National Environmental Policy Act, sec. 102(2)(c).

EPA. Environmental Protection Agency. A Federal agency created in 1970 to permit coordinated and effective governmental action for protection of the environment by the systematic abatement and control of pollution through integration of research, monitoring, standard setting and enforcement activities.

Exchange Gas. Gas that is received from (or delivered to) another party in exchange for gas delivered to (or received from) such other party.

Extraction Plant. A plant in which a product such as propane, butane, oil, or natural gasoline, which is initially a component of the gas stream, is extracted or removed for sale.

Farm Tractor Fuel. Any petroleum product, exclusive of gasoline diesel fuel, and liquefied petroleum gas, which is used for the generation of power for the operation of farm implements.

Fast Breeder Reactor. A fast nuclear reactor that operates with neutrons at the fast speed of their initial emission from the fission process, and that produces more fissionable material than it consumes.

Fast Reactor. A nuclear reactor in which the fission chain reaction is sustained primarily by fast neutrons. Fast reactors contain no moderator and inherently require enriched fuel. They are of interest because of favorable neutron economy which makes them suitable for breeding.

Fast Flux Testing Facility (FFTF). A major AEC experimental facility still under construction. When completed, it will provide neutron exposure for breeder fuels comparable to those expected in commercial fast breeder reactors.

Feed Materials (Nuclear). Refined uranium or thorium metal or compounds suitable for use in fabricating reactor fuel elements or as feed to uranium enrichment facilities.

Feedstock. Crude oil or a fraction thereof to be charged to any process equipment.

Fertile Material. A material, not itself fissionable by thermal neutrons, which can be converted into a fissionable material by irradiation in a nuclear reactor. The two basic fertile materials are uranium-238 and thorium-232. When these fertile materials capture neutrons, they become fissionable plutonium-239 and uranium-233, respectively.

FFTF. Fast Flux Testing Facility.

Final Cut. The pit remaining after stripping equipment has made its final pass through the deposit—usually, at the point where stripping depth to the coal has reached the economic limit. The resulting excavation has a spoil bank to one side, a highwall on the other, and a flat space between where the coal has been mined.

Finished Products. Petroleum oils, or a mixture or combination of such oils, or any component or components of such oils which are to be used without further processing.

Firedamp. A highly-explosive mixture of methane and air found in the seams of coal mines. It is frequently the cause of explosions in coal mines.

Fireflooding. A method to increase recovery of oil from existing fields Cf. in situ combustion.

Firm Natural Gas Service. High priority gas service in which the pipeline company has the contractual option to temporarily terminate deliveries to customers by reason of claim of firm service customers or high priority users. Large commercial facilities, industrial users, and electric utilities usually fall into this category.

Fission. The splitting of a heavy nucleus into two approximately equal parts (which are radioactive nuclei of lighter elements), accompanied by the release of a relatively large amount of energy and generally one or more neutrons. Fission can occur spontaneously, but usually is caused by nuclear absorption of neutrons or other particles.

Fission Products. The nuclei formed by the fission of heavy elements, plus nuclides formed by the fission fragments' radioactive decay. Fission products are intensely radioactive.

Fissionable Material. Any material fissionable by slow neutrons. The three basic ones are uranium-235, plutonium-239 and uranium-233.

Flare Gas. Unutilized natural gas burned in flares at an oil field; waste gas.

Flue Gas. Gas from the combustion of fuel, the heating value of which has been substantially spent and which is, therefore, discarded to the flue or stack.

Fluidized Bed. A fluidized bed results when a fluid, usually a gas, flows upward through a bed of suitably sized solid particles at a velocity high enough to buoy the particles, to overcome the influence of gravity, and to impart to them an appearance of great turbulence. Fluidized beds are used in the petroleum industry. The Office of Coal Research is developing a coal-fired fluidized bed boiler which would permit use of Western low sulfur coals without slagging, and use of high sulfur coals without causing unacceptable environmental effects.

Fly Ash. Fine solid particles on noncombustible ash carried out of a chimney with waste gases.

Fossil Fuel. Any naturally occurring fuel of an organic nature, such as coal, crude oil and natural gas.

Fuel. Any substance that can be burned to produce heat. Sometimes includes materials that can be fissioned in a chain reaction to produce heat. The energy content of common fuels are as follows:

1 Barrel (Bbl.) of Crude Oil equals 5,600,000 Btu.
1 Cubic Foot (CF) of Natural Gas equals 1,031 Btu.
1 Ton of Coal equals 13,000,000 to 26,000,000 Btu.

Two trillion Btu's per year are about equal to 1,000 barrels of crude oil per day.

Fuel Cell. A device for combining fuel and oxygen in an electro-chemical reaction to generate electricity; chemical energy is converted directly into electrical energy without combustion.

Fuel Energy Conversion Factors;

Coal:

Anthracite (Penn.)—26.0 million Btu/ton.
Bituminous—24.8 million Btu/ton
Sub-bituminous—19.0 million Btu/ton.
Lignite—13.4 million Btu/ton.

Petroleum;

Crude—5.6 million Btu/bbl.
Residual fuel oil—6.29 million Btu/bbl.
Distillate fuel oil—5.83 million Btu/bbl.
Gasoline—5.25 million Btu/bbl.
Jet fuel (kerosene-type)—5.67 Btu/bbl.
Kerosene—5.67 million Btu/bbl.
Petroleum coke—6.02 million Btu/bbl.
Diesel—5.825×10^6 Btu/bbl.
Shale—3.69 million Btu/ton.

Fuel cycle. The series of steps involved in supplying fuel for nuclear power reactors. It includes mining, refining of uranium, fabrication of fuel elements, their use in a nuclear reactor, chemical processing to recover remaining fissionable material, reenrichment of the fuel, refabrication into new fuel elements, and waste storage.

Fuel Depot. A bulk storage installation composed of storage tanks and related facilities such as docks, loading racks, and pumping units.

Fuel Element. A rod, tube, plate or other shape or form into which nuclear fuel is fabricated for use in a reactor.

Fuel Fabrication. The manufacturing and assembly of reactor fuel elements containing fissionable and fertile nuclear material.

Fuel Gas. Synthetic gas used for heating or cooling. It has less energy content than pipeline quality gas. The Office of Coal Research is developing a process to produce clean, low-Btu fuel gas from coal. The product could be burned in nearby power plants, or could be a feed material for production of other synthetic fuels such as high Btu pipeline gas.

Fuel Oil. Any liquid or liquefiable petroleum product burned for the generation of heat in a furnace or firebox, or for the generation of power in an engine.

Fuel Rate. The amount of fuel needed to generate one kilowatt-hour of electricity. In 1969 the rates were 0.88 pounds of coal, average, in the United States electricity industry, 0.076 gallons of oil and 10.4 cubic feet of natural gas.

Fuel Reprocessing. The processing of reactor fuel to recover the unused, residual fissionable materials.

Fusion. The formation of a heavier nucleus from two lighter ones, such as hydrogen isotopes, with the attendant release of energy.

Furnace Oil. A distillate fuel primarily intended for use in domestic heating equipment.

Gallon. A unit of measure. A U.S. gallon contains 231 cu in., 0.133 cubic feet, or 3.785 liters. It is 0.83 times the imperial gallon. One U.S. gallon of water weighs 8.3 lb.

Gas Cap. A layer of gas on top of oil in an underground structure, or reservoir.

Gas, Casinghead. Unprocessed natural gas produced from a reservoir containing oil. Sometimes called Bradenhead Gas.

Gas Centrifuge Process. A method of enrichment in which heavier uranium atoms are partially separated from lighter ones by centrifugal force.

Gas Cooled Fast Breeder Reactor (GCBR). A fast breeder reactor which is cooled by a gas, usually helium, under pressure.

Gas Cycling. A petroleum recovery process which takes gas produced with oil and injects it back into the oil sand to aid in producing more oil.

Gas, Dry. Gas whose water content has been reduced by a dehydration process. Gas containing little or no hydrocarbons commercially recoverable as liquid product. Specified small quantities of liquids are permitted by varying statutory definitions in certain states.

Gaseous Diffusion Process. A method of enriching uranium based on the tendency of gas atoms or molecules of different masses to diffuse through a porous barrier, or membrane, at different rates.

Gas, Illuminating. A gas containing relatively large amounts of unsaturated and/or heavy hydrocarbon gases, which burn with a luminous flame.

Gas Impurities. Undesirable matter in gas, such as dust, excessive water vapor, hydrogen sulfide, tar and ammonia.

Gas, Manufactured. A gas obtained by destructive distillation of coal, or by the thermal decomposition of oil, or by the reaction of steam passing through a bed of heated coal or coke. Examples are coal gases, coke oven gases, producer gas, blast furnace gas, blue (water) gas, carbureted water gas. Btu content varies widely.

Gas, Natural. A naturally occurring mixture of hydrocarbon. Gases found in porous geologic formations beneath the earth's surface, often in association with petroleum. The principal constituent is methane.

Associated. Free natural gas in immediate contact, but not in solution, with crude oil in the reservoir.

Dry. See *Gas, Dry.*

Liquefied (LNG). A clear, flammable liquid both tasteless and odorless. Its normal temperature at atmospheric pressure is 259 degrees F. It remains a liquid at 116 degrees F. and 673 psia. Liquefied natural gas is almost pure methane. In volume it occupies 1/600 of the gas in vapor state.

Non-Associated. Free natural gas not in contact with, nor dissolved in, crude oil in the reservoir.

Sour. Gas found in its natural state, containing such amount of compounds of sulfur as to make it impractical to use, without purifying, because of its corrosive effect on piping and equipment.

Sweet. Gas found in its natural state, containing such small amounts of compounds of sulfur that it can be used without purifying, with no deleterious effect on piping and equipment.

Wet. Wet natural gas is unprocessed natural gas or partially processed natural gas, produced from strata containing condensable hydrocarbons. The term is subject to varying legal definition as specified by certain state statutes.

Gas, Oil. A gas resulting from the thermal decomposition of petroleum oils, composed mainly of volatile hydrocarbons and hydrogen. The true heating value of oil gas may vary between 800 and 1,600 Btu per cubic foot depending on operating conditions and feedstock properties.

Gasoline. A refined petroleum distillate, including naphtha, jet fuel or other petroleum oils (but not isoprene or cumene having a purity of 50 percent or more by weight, or benzene which meets the ASTM distillation standards for nitration grade) derived by refining or processing crude oil or unfinished oils, in whatever type of plant such refining or processing may occur, and having a boiling range at atmospheric pressure from 80 degrees to 400 degrees F.

Gas, Synthesis. A mixture of CO and H_2 containing small amounts of nitrogen, some carbon dioxide, and various trace impurities prepared for petro-chemical synthesizing processes.

Gas, Turbine. A prime mover in which gas, under pressure or formed by combustion, is directed against a series of turbine blades; the energy in the expanding gas is converted into mechanical energy supplying power at the shaft.

GCBR. Gas Cooled Fast Breeder Reactor.

Generation, Electric. The process of transforming other forms of energy into electric energy.

Geological Survey. A bureau of the Department of the Interior established in 1879. The objectives of the Survey are to "perform surveys, investigations, and research covering topography, geology, and the mineral and water resources of the United States; classify land as to mineral character and water and power resources; enforce departmental regulations applicable to oil, gas, and other mining leases, permits, licenses, development contracts, and gas storage contracts; and publish and disseminate data relative to the foregoing activities.

Geothermal; Geothermic. Of or relating to the heat of the earth's interior.

Geothermal Gradient. The change in temperature of the earth with depth, expressed either in degrees per unit depth, or in units of depth per degree. The mean rate of increase in temperature with depth in areas that are not adjacent to volcanic regions is about 1 degree F in about 55 feet, corresponding to about 100 degrees F per mile of depth.

Geothermal Steam. Steam drawn from deep within the earth. There are about 90 known places in the continental United States where geothermal steam could be harnessed for power. These are in California, Idaho, Nevada and Oregon.

Gigawatt (GW). 1,000,000 kilowatts, 1,000 megawatts.

GPM. Gallons per Minute.

GPS. Gallons per Second.

Gross National Product (GNP). The total market value of the goods and services produced by the Nation before the deduction of depreciation charges and other allowances for capital consumption; a widely used measure of economic activity.

Half-Life, Radioactive. Time required for a radioactive substance to lose 50% of its activity by decay. Each radionuclide has a unique half-life.

Heat Value. The amount of heat obtainable from a fuel—expressed, for example, in British thermal units (Btu)/pound of coal.

Hertz. Cycles per Second. U.S. electrical supply has a frequency of 60 Hertz.

High Btu Oil-Gas Process. A manufactured gas process in which oil is converted into a fuel gas having a higher heating value than that of coal gas or carbureted water gas. Often called Hi-Btu Gas Process.

High Temperature Gas Cooled Reactor (HTGCR). A promising approach to commercial nuclear power which would permit more efficient use of uranium and also some use of thorium in its fuel cycle. Also offers greater thermal efficiency than light water reactors.

Highwall. The unexcavated face of exposed overburden and coal in a strip mine.

Holder, Gas. A gas-tight receptacle or container in which gas is stored for future use. There are two general ways of storing gas: (1) at approximately constant pressure (low pressure containers) in which case the volume of the container changes, and (2) in containers of constant volume (usually high pressure containers) in which case the quantity of gas stored varies with the pressure.

Holder, Storage. A gas holder for storage of excess gas supply for use during times of excess demand.

Hopper Car. A railway car for coal, gravel, etc., shaped like a hopper, with an opening to discharge the contents.

Horsepower (Hp.). A standard unit of power equal to 746 watts in the United States. One horsepower equals 2,545.08 Btu (mean)/hour, 550 foot-pounds/second.

Horsepower, Boiler. The equivalent evaporation of 34.5 lbs. of water per hour at 212 degrees F and above. This is equal to a heat output of 33,475 per hour.

Horsepower Hour. One horsepower expended for one hour, or the horsepower multiplied by the number of hours. One horsepower hour equals 1,980,000 foot-pounds, 0.745 kilowatt-hours, 2,545 Btu (mean).

Hp. Horsepower.

HTGCR. High Temperature Gas Cooled Reactor.

Hydraulic Fracturing. A general term, for which there are numerous trade or service names, for the fracturing of rock in an oil or gas reservoir by pumping a fluid under high pressure into the well. The purpose is to produce artificial openings in the rock in order to increase permeability.

Hydrocarbon Fuels. Fuels that contain an organic chemical compound of hydrogen and carbon.

HRI. Hydrocarbon Research Inc.

Hydrocracking. A process combining cracking or pyrolysis, with hydrogenation. Feedstocks can include crude oil, residue, petroelum tars, and asphalts.

Hydroelectric Powerplant. An electric powerplant in which the turbine generator are driven by falling water.

Hydrofining. A fixed-bed catalytic process to desulfurize and hydrogenate a wide range of charge stocks from gases through waxes.

Hydroforming. A process in which naphthas are passed over a catalyst at elevated temperatures and moderate pressures, in the presence of added hydrogen or hydrogen-containing gases, to form high-octane motor fuel or aromatics.

Hydrotreating. The removal of sulfur from low-octane gasoline feedstocks by replacement with hydrogen.

Hydrogen/Synthesis Gas. A process being developed by the Office of Coal Research and the American Gas Association to produce either hydrogen or synthesis gas.

HYGAS. A process being developed by the Office of Coal Research and the American Gas Association to produce pipeline quality gas by hydrogasification of coal. Development being done by the Institute for Gas Technology.

IGT. Institute of Gas Technology.

Injection. (Gas injection, water injection). Forcing gas or water into an oil well in order to increase pressure within the well to force oil to the surface.

In-Situ. In the natural or original position; applied to a rock, soil or fossil when occurring in the situation in which it was originally formed or deposited.

In-Situ Combustion. An experimental means of recovery of oil of low gravity and high viscosity which is unrecoverable by other methods. The oil is headed by igniting the oil sand and keeping the fire alive by air injection. The heat breaks the oil down to coke and lighter oils and the coke catches fire. As the combustion front advances, the lighter oils move ahead of the fire into the bore of a producing well. Also known as fireflooding.

In-Situ Recovery. Refers to methods to extract the fuel component of a deposit without removing the deposit from its bed.

Intangible Drilling Costs. Expense items that are written off in the year incurred for tax purposes.

Ionized Gas. A gas that is capable of carrying an electric current.

JCAE. Joint Committee on Atomic Energy.

Jet Fuel. Includes both naphtha-type and kerosine-type fuels meeting standards for use in aircraft turbine engines. Although most jet fuel is used in aircraft, some is used for other purposes, such as for generating electricity in gas turbines.

Jobber. A petroleum distributor who purchases refined product from a refiner or terminal operator for the purpose of reselling to retail outlets and commercial accounts or for the purpose of retailing through his own retail outlets.

Jobber Margin. The difference between the price at which a jobber purchases refined product from a refiner or terminal operator and the price at which the jobber sells to retail outlets. This does not reflect margins obtained by jobbers through retail sales or commercial accounts.

Jobber Price. The price at which a petroleum jobber purchases refined product from a refiner or terminal operator.

Joule. A unit of energy or work which is equivalent to one watt per second or 0.737 foot-pounds.

Kerosene. Any jet fuel, diesel fuel, fuel oil or other petroleum oils derived by refining or processing crude oil or unfinished oils, in whatever type of plant such refining or processing may occur, which has a boiling range at atmospheric pressure from 400 degrees to 550 degrees F.

Kerosine. A colorless mixture of hydrocarbons, obtained by the fractional distillation of petroleum and used as a fuel. It was once called coal oil because of its origin.

Kilogram. (Kg). The unit of weight in the metric system, equal to 1,000 grams or 2.2 lb.

Kiloton (Kt). A measure of explosive force which originated in the early nuclear weapons program. One kiloton represents the energy of 10^{12} calories, or 3.9 x 10^{9} Btu., or 4 x 10 ^{12} joules.

Kilovolt (kV). 1000 volts.

Kilovoltampere (kVa). An electrical term that indicates the energy in an alternating current circuit. It is the product of voltage and current.

Kilowatt (Kw). 1,000 watts. A unit of power equal to 1,000 watts, or to energy consumption at a rate of 1000 joules per second. It is usually used for electrical power. An electric motor rated at one horsepower uses electrical energy at a rate of about ¾ kilowatt.

Kilowatt-Hour (kWh). A unit of work or energy equal to that expended by one kilowatt in one hour. It is equivalent to 3,413 Btu of heat energy.

Kinetic Energy. The energy of motion; the ability of an object to do work because of its motion.

kV. Kilovolt.

kVa. Kilovoltampere.

Kr. Kiloton.

Landed Cost. The cost of imported crude oil equal to actual cost of crude at point of origin plus transportation cost to the United States.

Light Oil. Any of the products distilled or processed from crude oil up to, but not included, the first lubricating oil distillate.

Light-Water Reactor (LWR). Nuclear reactor in which water is the primary coolant/moderator with slightly enriched uranium fuel. There are two commercial light-water reactor types—the boiling water reactor (BWR) and the pressurized water reactor (PWR).

Lignite. A low grade coal of a variety intermediate between peat and bituminous coal.

Liquefied Gases. They include the following liquefied or liquefiable gases: ethane, propane, butanes, ethylene, propylene, and butylenes. These are derived by refining or other processing of natural gas, crude oil, or unfinished oils.

Liquefied Natural Gas (LNG). A clear, flammable piquid both tasteless and odorless; almost pure methane.

Liquefied Petroleum Gas (LPG). A gas containing certain specific hydrocarbons which are gaseous under normal atmospheric conditions, but can be liquefied under moderate pressure at normal temperatures; principal examples are propane and butane.

Liquid Metal Fast Breeder (LMFBR). A nuclear breeder reactor cooled by molten sodium in which fission is caused by fast neutrons.

Liquid Phase Methanation. A process being developed by the Office of Coal Research and the American Gas Association to convert hydrogen and carbon monoxide to methane which can be used as a pipeline gas.

Liquids, Natural Gas. Liquid hydrocarbon mixtures which are gaseous at reservoir temperatures and pressures but are recoverable by condensation or absorption. Natural gasoline and liquefied petroleum gases fall in this category.

Liter. The primary standard of capacity in the metric system, equal to the volume of one kilogram of pure water at maximum density, at approximately 4 degrees C, and under normal atmospheric pressure. One liter=0.264 gallons (U.S.), 1.05 quarts (U.S.) or 2.11 pints (U.S.).

Lithium. Element No. 3 (symbol, Li; atomic weight 6.94). As found in nature, lithium consists of a mixture of two stable isotopes-lithium-6 (7.5%) and lithium-7 (92.4%). Lithium-6 is of interest as a possible fuel or source thereof for the generation of power from a controlled thermonuclear reaction.

LNG. Liquefied Natural Gas.

Load. The amount of power needed to be delivered to a given point on an electric system.

Load Factor. The ratio of the average load supplied during a designated period to the peak of the maximum load occurring in the same period for an electrical system.

Longwall Mining. A method of working coal seams that originated in England in the 17th century. The seam is removed in one operation by means of a long working face, or wall. The workings advance (or retreat) in a continuous line. The space from which the coal has been removed is either allowed to collapse or is completely or partially filled or stowed with stone and debris. Longwall mining emphasizes economy of extracting the maximum amount of scarce reserves. In contrast the conventional American pillar and block approach emphasizes the bountiful nature of U.S. coal reserves.

LNG. Liquefied Petroleum Gas.

Lubricating Oils. Any lubricant containing more than 50 percent by volume of refined petroleum distillates or specially treated petroleum residuum.

Lurgi Process. Of German origin, it is the only commercially available process for coal gasification.

LWR. Light-water reactor.

Magnetohydrodynamics (MHD). A branch of physics that deals with magnetohydrodynamic phenomenon (of or relating to phenomena arising from the motion of electrically conducting fluids in the presence of electric and magnetic fields). In open-cycle MHD generators, the working fluid is exhausted to the atmosphere. In the closed-cycle MHD, the working fluid is continuously recirculated through a closed loop.

Marketable Natural Gas. Raw gas from which certain hydrocarbon and nonhydrocarbon compounds have been removed or partially removed by processing. Marketable natural gas is often referred to as pipeline gas, residue gas, or sales gas.

Mcf. One thousand cubic feet.

Mcfd. One thousand cubic feet per day.

Mcfh. One thousand cubic feet per hour.

Margin. The difference between the net system generating capability and system maximum load requirements including net schedule transfers with other systems.

Megawatt (MW). 1000 kilowatts, 1 million watts.

Megawatt-Day Per Ton (Mwdft). A unit that expresses the burnup of nuclear fuel in a reactor; specifically the number of megawatt-days of heat output per metric ton of fuel in the reactor.

Metallurgical Coal. Coal with strong or moderately strong coking properties that contains no more than 8.0 percent ash and 1.25 percent sulfur, as mined or after conventional cleaning.

Methane (CH_4). The lightest in the paraffin series of hydrocarbons. It is colorless, odorless and flammable. It forms the major portion of marsh gas and natural gas.

Methyl Alcohol (CH_3OH). A poisonous liquid, also known as methanol, which is the lowest member of the alcohol series. Also known as wood alcohol, since its principal source is the destructive distillation of wood.

Metric Ton. 1,000 kilograms, equal to 2,204.6 lbs.

Middle Distillate. One of the distillates obtained between kerosine and lubricating oil fractions in the refining processes. These include light fuel oils and diesel fuel.

Mine. An opening or excavation in the earth for the purpose of extracting minerals; a pit or excavation in the earth from which metallic ores or other mineral substances are taken by digging.

Mine-Mouth Plant. A steam-electric plant or coal gasification plant built close to a coal mine and usually associated with delivery of output via transmission lines or pipelines over long distances as contrasted with plants located nearer load centers and at some distance from sources of fuel supply.

Mmcf. Million cubic feet.

Molten-Iron Process. A process being developed by the Office of Coal Research and the American Gas Association to gasify coal without causing a sulfur oxide pollution problem. It uses a molten-iron bath with air or oxygen. The product gases are essentially methane, carbon monoxide and hydrogen which with methanation can be made into pipeline-quality gas. It is said to be the only process suitable for gasifying any coal, including anthracite and lignite.

Molten Salt Breeder Reactor (MSBR). A breeder reactor in which the fuel would be in the form of a molten salt of plutonium or uranium. It offers several technical advantages, but poses severe, unresolved engineering problems. The AEC's support for MSBR research terminated in June 1973.

Motor Gasoline Production. Total production of motor gasoline by refiners, measured at refinery outlet. Relatively small quantities of motor gasoline are produced at natural gas processing plants, but these quantities are not included.

Motor Gasoline Stocks. Primary motor gasoline stocks held by gasoline producers. Stocks at natural gas processing plants are not included.

Mtce. Million tons of coal equivalent. A comparative unit of energy content widely used in the oil industry. 1 Mtce=4.48 million bbl oil=25.19 trillion cubic feet natural gas.

Multiple Seam Mining. Mining two or more seams of coal that occur in a vertical sequence.

Multi-purpose Transmission Line. Employment of a transmission line for more than one function, such as regular transmission, wheeling, reserve capacity, and peak capacity usage.

Natural Gas. Naturally occurring mixtures of hydrocarbon gases and vapors, the more important of which are methane, ethane, propane, butane, pentane, and hexane. The energy content of natural gas is usually taken as 1032 Btu/cu. ft.

Natural Gas Liquids. The hydrocarbon components: propane, butanes, and pentanes (also referred to as condensate), or a combination of them that are subject to recovery from raw gas liquids by processing in field separators, scrubbers, gas processing and reprocessing plants, or cycling plants. The propane and butane components are often referred to as liquefied petroleum gases of LPG.

Natural Gas Marketed Production. Gross withdrawals from the ground, less gas used for repressuring and quantities vented and flared. Gas volumes are reported at a base pressure of 14.73 pounds per square inch absolute at 60° F. Data are from Bureau of Mines and are collected from reports received from the Interstate Oil Compact Commission provided by State agencies.

Natural Gas Products. Liquids (under atmospheric conditions), including natural gasoline, which are recovered by process of absorption, adsorption, compression, refrigeration, cycling or a combination of such processes, from mixtures of hydrocarbon that existed in a reservoir.

Natural Gasoline. A mixture of liquid hydrocarbons extracted from natural gas and stabilized to obtain a liquid product suitable for blending with refinery gasoline.

Natural Uranium. Uranium as found in nature, containing 0.7% uranium–235, 99.3% of uranium–238 and a trace of uranium–234. It is also called normal uranium.

New Oil. The volume of domestic crude petroleum produced from a property in a specific month which exceeds the base production control level for that property.

Nitrogen Oxides (NOx). A product of combustion of fossil fuels whose production increases with the temperature of the process. It can become an air pollutant if concentrations are excessive.

Normal Uranium. See natural uranium.

Non-Associated Gas. Free natural gas not in contact with, nor dissolved in, crude oil in the reservoir.

Nuclear Fuel Cycle. The various steps which involve the production, processing, use and reprocessing of nuclear fuels.

Nuclear Power Plant. Any device, machine, or assembly that converts nuclear energy into some form of useful power, such as mechanical or electrical power.

Nuclear Reactor. A device in which a fission chain reaction can be initiated, maintained, and controlled. Its essential component is a core with fissionable fuel. It usually has a moderator, reflector, shielding coolant and control mechanisms. It is the basic machine of nuclear power.

OAPEC. Organization of Arab Petroleum Exporting Countries. It was founded in 1968 for cooperation in economic and petroleum affairs. Original members were Saudi Arabia, Kuwait, and Libya. In 1970, Abu Dhabi, Algeria, Bahrain, Dubai, and Qatar joined.

OCS. Outer continental shelf.

Office of Coal Research (OCR). A bureau of the Department of the Interior established in 1960 to develop new and more efficient methods of mining, preparing, and utilizing coal. Now with the U.S. Energy Research and Development Administration.

Off Shore Windpower System (OWPS). A proposed system to generate electricity by wind turbines mounted on off-shore platforms advocated by Professor W. E. Heronomus of the University of Massachusetts. (Cf. Congressional Record, April 30, 1973, p. E2666, daily edition).

OPEC. Organization of Petroleum Exporting Countries. Founded in 1960 to unify and coordinate petroleum policies of the members. The members and the date of membership are: Abu Dhabi (1967); Algeria (1969); Indonesia (1962); Iran (1960); Iraq (1960); Kuwait (1960); Libya (1962); Nigeria (1971); Qatar (1961); Saudi Arabia (1960); and Venezuela (1960). OPEC headquarters is in Vienna, Austria.

Oil Shale. A convenient expression used to cover a range of materials containing organic matter (Kerogen) which can be converted into crude shale oil, gas and carbonaceous residue by heating.

Old Oil. Same as controlled crude oil.

Original Oil-In-Place. The estimated number of barrels of crude oil in known reservoirs prior to any production, usually expressed as "stock tank" barrels or the volume that goes into a stock tank after the shrinkage that results when dissolved gas is separated from the oil.

Outage. The period in which a generating unit, transmission line or other facility, is out of service.

Outcrop (Cropline). A line on the earth's surface where a coal bed or other rock strata comes to the surface. An outcrop does not necessarily require the visible presence of coal or other mineral at the surface but includes those places where they may be covered by a mantle of soil or other surface material.

Overburden. Earth, rock and other material overlying a seam of coal. The term is used where the coal is at sufficiently shallow depth to permit strip mining.

Particulate Matter. Solid particles, such as ash, which are released from combustion process in exhaust gases at fossil-fuel plants.

Parting. A layer of rock contained within, and lying roughly parallel to, a seam of coal. A parting has the effect of splitting a seam into two divisions or benches.

Petroleum. An oily flammable bituminous liquid that may vary from almost colorless to black, occurs in many places in the upper strata of the earth, is a complex mixture of hydrocarbons with small amounts of other substances, and is prepared for use as gasoline, naphtha, or other products by various refining processes.

Petroleum Naphtha. A generic term applied to refined, partially refined or unrefined petroleum products and liquid products of natural gas. The naphthas used for specific purposes, such as cleaning, manufacture of rubber, paints, varnishes, etc., are made to have more volatility than that set by the limits of this definition.

Petroleum Spirits. A refined petroleum distillate with volatility, flash point, and other properties making it suitable as a thinner and solvent in paints, varnishes, and similar products.

Petroleum Tar. A viscous black or dark-brown product obtained in petroleum refining which will yield a substantial quantity of solid residue when partly evaporated or fractionally distilled.

Pilot Plant. A small-scale industrial process unit operated to test the application of a chemical or other manufacturing process under conditions that will yield information useful in the design and operation of full-scale manufacturing equipment. The pilot unit serves to disclose the special problems to be solved in adapting a successful laboratory method to commercial sized units.

Plutonium. A fissionable element that does not occur in nature but is obtained by exposure of U^{238} to neutrons in a reactor.

Ppm. Parts per Million.

Pressurized-Water Reactor. A power reactor in which heat is transformed from the core to a heat exchanger by water kept under high pressure to prevent it from boiling. Steam is generated in a secondary circuit.

Primary Fuel. Fuel consumed in original production of energy as contrasted to a conversion of energy from one form to another.

Primary Stocks of Refined Products. Stocks held at refineries, bulk terminals, and pipelines.

Probable Reserves. A realistic assessment of the reserves that will be recovered from known oil or gas fields based on the estimated ultimate size and reservoir characteristics of such fields. Probable reserves include those reserves shown in the proved category.

Project Independence. A large-scale study initiated by the Federal Government to evaluate the Nation's energy problems and to provide a framework for developing a national energy policy. The main thrust of the report was analysis of the actions necessary to minimize U.S. reliance on energy imports (primary petroleum). Most actions were evaluated in terms of $7 and $11 oil prices existing in the United States. See Business as Usual, Conservation, and Accelerated Supply strategies.

Proved Reserves. The estimated quantity of crude oil, natural gas, natural gas liquids or sulfur which analysis or geological and engineering data demonstrates with reasonable certainty to be recoverable from known oil or gas fields under existing economic and operating conditions.

Psi. Pounds per square inch.

Psia. Pounds per square inch absolute. A measure of pressure that includes atmospheric pressure.

Pumped Storage. An arrangement whereby additional electric power may be generated during peak load periods by hydraulic means using water pumped into a storage reservoir during off-peak periods.

Quadrillion. 1 million billion; 10^{15}.

Q Unit. One quintillion Btu (1×10^{18} Btu). A very large unit of energy. $1Q = 38.46$ billion tons of coal, 172.4 billion bbls of oil, 968.9 trillion cu. ft. natural gas.

Raw Gas. Natural gas, in its natural state, existing in or produced from a field.

Raw Materials. Ores and crude concentrates of uranium and thorium.

Recoverable Reserves. Minerals expected to be recovered by present day techniques and under present economic conditions.

Reduced Crude. A residential product remaining after the removal, by distillation or other means, of an appreciable quantity of the more volatile components of crude oil.

Refine. To cleanse or purify by removing undesired components; to process a material to make it usable.

Refined Products Domestic Demand. A calculated value, computed as domestic production plus net imports (imports less exports), less the net increase in primary stocks. It, therefore, represents the total disappearance of refined products from primary supplies.

Refined Products Imports. Imports of motor gasoline, naphtha-type jet fuel, kerosine-type jet fuel, liquified petroleum gases, kerosine, distillate fuel oil, residual fuel oil, petro-chemical feedstocks, special naphthas, lubricants, waxes, and asphalt. Imports of bonded bunkers, jet fuel, distillate and residual fuel oils for onshore military use, and receipts from Puerto Rico, the Virgin Islands, and Guam are based on data reported to the Oil Import Administration of FEA. All other figures are compiled by Bureau of Mines from Department of Commerce data.

Refiner Acquisition Cost. The cost to the refiner, including transportation and fees, of crude petroleum. The composite cost is the average of domestic and imported crude costs and represents the amount of crude cost which refiners may pass on to their customers.

Released Oil. That portion of the base production control level for a property which is equal to the volume of new oil produced in that month and which may be sold above the ceiling price. The amount of released oil may not exceed the base production control level for that property.

Refinery. A device (usually a tower) or process which heats crude oil so that it separates into chemical components, which are then distilled off as more usable substances. Simple structure components vaporize first. Typical crude fractions, from top to bottom or simple to complex, are: methane, and ethane (the gasolines); propane, and butane; kerosene, fuel oil, and lubricants; jelly paraffin, asphalt, and tar.

Refinery Gas. Any form or mixture of gas gathered in a refinery from the various stills.

Refining. The separation of crude oil into its component parts, and the manufacture of products needed for the market. Important processes in refining are distillation, cracking, chemical treating and solvent extraction.

Reforming. The thermal or catalytic conversion of naphtha into more volatile products of higher octane number.

Refrigeration Ton. A unit of cooling capacity. In commercial usage, 12,000 Btu per hour or 200 Btu per minute of heat removal. Originally, the amount of heat required to melt a ton of ice in 24 hours.

Remaining Reserves. Those quantities of crude oil, natural gas, natural gas liquids and sulfur as estimated under proved or probable reserves after deducting those quantities produced up to the respective date of the estimate.

Reprocessing. Chemical recovery of unburned uranium and plutonium and certain fission products from spent fuel elements that have produced power in a nuclear reactor.

Reserves. Identified deposits known to be recoverable with current technology under present economic conditions.

Categories of Reserves

1. *Measured reserves.* Identified resources from which an energy commodity can be economically extracted with existing technology, and whose location, quality, and quantity are known from geologic evidence supported by engineering evidence.

2. *Indicated reserves.* Reserves based partly on specific measurements, samples, or production data, and partly from projections for a reasonable distance on geological evidence.
3. *Inferred reserves.* Reserves based upon broad geologic knowledge for which quantitative measurements are not available. Such reserves are estimated to be recoverable in the future as a result of extensions, revisions of estimates, and deeper drilling in known fields. Indicated and inferred reserves are undifferentiated in this report.

Reserves of coal are sometimes discussed in terms of a different definition. See Demonstrated Coal Reserve Base.

Residual Fuel Oil. The heavier oils that remain after the distillate fuel oils and lighter hydrocarbons are boiled off in refinery operations. Included are products known as ASTM grades Nos. 5 and 6 oil, heavy diesel oil, Navy Special Oil, Bunker C oil, and acid sludge and pitch used as refiner fuels. Residual fuel oil is used for the production of electric power, for heating, and for various industrial purposes.

Resources. Includes reserves as well as materials that have been identified, but cannot now be extracted because of economic or technological limitations, as well as economic or subeconomic materials that have not as yet been discovered. Recoverable resources are quantities of an energy commodity that may be reasonably expected to exist in favorable geologic settings, but that have not yet been identified by drilling. Exploration will permit the reclassification of such resources to the reserves category.

Retort. A vessel used for the distillation of volatile materials, as in the separation of some metals and the destructive distillation of coal; also a long semi-cylinder, now usually of fire clay or silica, for the manufacture of coal gas.

Rotary Rig. Machine used for drilling wells that employs a rotating tube attached to a bit for boring holes through rock.

Royalty Bidding. Competitive bidding for leases in which the lease is offered to the company offering to pay the landowner the largest share of the proceeds of production, free of expenses of production.

Rio Blanco. Name of an AEC industry experiment to stimulate production of natural gas by use of multiple nuclear explosions and to test the economic feasibility of future utilization of nuclear stimulation of an entire gas field. The test was made on May 16, 1973 near Meeker, in Rio Blanco County, Colorado.

Rulison. Name of an AEC industry experiment to stimulate production of natural gas by use of a nuclear explosive to fracture impermeable rocks. Conducted in 1969.

Scf. Standard cubic feet.

Scfd. Standard cubic feet per day.

Secondary Recovery. Oil and gas obtained by the augmentation of reservoir energy; often by the injection of air, gas or water into a production formation.

Separative work unit (SWU). A measure of the effort expended in a uranium enrichment plant to separate a quantity of uranium of a given assay into two components, one having a higher percentage of uranium-235 and one having a lower percentage. Separative work is generally expressed in kilogram units. Therefore, a SWU is a kilogram separative work unit.

Shale Oil. A liquid similar to conventional crude oil but obtained from oil shale by conversion of organic matter (kerogen) in oil shale.

Solar Energy. The energy transmitted from the sun, which is in the form of electromagnetic radiation. Although the Earth receives about one-half of one billionth of the total solar energy output, this amounts to about 420 trillion kilowatt-hours annually.

Solar Furnace. An optical device with large mirrors that focuses the rays from the sun upon a small focal point to produce very high temperatures.

Solar Power. Useful power derived from solar energy. Both steam and hot-air engines have been operated from solar energy. Large solar steam engines were built in California, Arizona and Egypt between 1900 and 1914. None of these engines have survived because of competition from the gasoline engine and electric motor.

Solvent Refined Coal. A process being developed by the Office of Coal Research to treat coal to remove ash, sulfur and other impurities. The end product contains about 16,000 Btu per pound, has an ash content of 0.1 percent and a very low sulfur content of about 0.5 percent. The product is solid at room temperature, but can be liquefied by use of relatively low heat.

Source Material. As defined in the Atomic Energy Act of 1954, any material, except special nuclear material, which contains 0.05% or more uranium, thorium, or any combination of the two.

SNG. Snythetic gas.

SO_2. Sulfur Dioxide.

Special Nuclear Material. As defined in the Atomic Energy Act of 1954, this term refers to plutonium-239, uranium-238, enriched uranium, or any material artificially enriched in any of these substances.

Spoil (Spoil Bank). The overburden removed and dumped to the side in gaining access to a coal bed in strip mining operations.

Stack Gas Desulfurization. Treating of stack gases to remove sulfur compounds.

Steam-Electric Plant. A plant in which the prime movers (turbines) connected to the generators are driven by steam.

Steam-Iron Process. A process being developed by the Office of Coal Research and the American Gas Institute to supply hydrogen for the HYGAS coal gasification process.

Strip Mining. A type of surface mining whereby overburden and coal are removed from successive long parallel cuts, with overburden from the second and successive cuts being placed in the previously mined cut. This system is practicable only where the coal lies close to the surface. Strip mines operate where the depth of the minable coal beds increases gradually, allowing mining to proceed at distances of up to a mile or more into the outcropping seam. This method is common in the Midwest and West.

Stripper Well Lease. A property of which the average daily production of crude petroleum and petroleum condensates, including natural gas liquids, per well did not exceed 10 barrels per day during the preceding calendar month.

Stripping. Removal of the lightest fractions from a mixture.

Subsidence. A sinking down of a part of the earth's crust. The lowering of the strata, including the surface, due to underground excavations, often coal mines.

Super Tanker. A very large oil tanker. The definition changes with advancing marine technology. In the late 1940s, 45,000 dwt tankers were considered super tankers; in the 1950s, 100,000 dwt was a super tanker; now common usage is 500,000 dwt, and still larger ships are planned.

Surface Mining. The obtaining of coal from the outcroppings or by the removal of overburden from a seam of coal, as opposed to underground mining; or any mining at or near the surface. Also called strip mining; placer mining; opencast; opencut mining; open-pit mining.

Sweetening. The process by which petroleum products are improved in odor and color by oxidizing or removing the sulfur-containing and unsaturated compounds.

SWU. Separative work-unit.

Syncrude. Synthetic crude oil derived from coal or oil shale.

Syngas. Synthetic gas (SNG).

SYNTHANE. A coal gasification process being developed by the Bureau of Mines to produce pipeline quality gas.

Tcf. Trillion cubic feet. A unit of measure commonly used for natural gas. 1 Tcf = 39.3 million tons of coal, 184 million bbl oil.

Tar Sands. Hydrocarbon bearing deposits distinguished from more conventional oil and gas reservoirs by the high viscosity of the hydrocarbon, which is not recoverable in its natural state through a well by ordinary oil production methods.

Tertiary Recovery. Use of heat and other methods other than fluid injection to augment oil recovery (presumably occurring after secondary recovery).

Thermal Efficiency. The ratio of the heat used to the total heat units in the fuel consumed.

Thermal Pollution. An increase in the temperature of water resulting from waste heat released by a thermal electric plant to the cooling water when the effects on other uses of the water are detrimental.

Thermal Power Plant. Any electric power plant which operates by generating heat and converting the heat to electricity.

Thermal Reactor. A nuclear reactor in which the fission process is propagated mainly by thermal neutron, i.e., by neutrons that have been slowed down until they are in thermal equilibrium with the atoms of the moderator.

Thermionic Conversion. A conversion device in which electrical energy is produced directly from heat energy. Theoretical efficiencies range from 15 to 33% with actual performance of 5 to 16%.

Thermodynamics. The science and study of the relationships between heat and mechanical work. First Law: Energy can neither be created nor destroyed. Second Law: Heat cannot pass from a colder to a warmer body without the additional expenditure of energy.

Thermoelectric Conversion. Conversion of heat energy into electricity based on the Seebeck effect in which a difference in temperature between junctions of a closed circuit comprised of two dissimilar metals produces an electric current.

Thermonuclear Fusion. Source of energy available from hydrogen isotopes in seawater.

Thorium (TH). A naturally radioactive element with atomic number 90 and, as found in nature, an atomic weight of approximately 232. The fertile thorium-232 isotope is abundant and can be transmuted to fissionable uranium-233 by neutron irradiation. (A naturally radioactive metal. One of its natural isotopes can be converted in nuclear reactors to a nuclear fuel.)

Ton. A unit of weight equal to 2,000 pounds in the United States, Canada and the Union of South Africa, and to 2,240 pounds in Great Britain. The American ton is often called the short ton, while the British ton is called the long ton. The metric ton, or 1,000 kilograms, equals 2,204.62 pounds. Depending upon specific gravity, a long ton or metric ton will equal from 6.5 to 8.5 barrels of oil.

Topping. The distillation of crude oil to remove light fractions only.

Topping Cycle. A means to increase thermal efficiency of a steam-electric power plant by increasing temperatures and interposing a device, such as a supercritical gas turbine, between the heat source and the conventional steam-turbine generator part of the plant to convert some of the additional heat energy into electricity.

Total Energy. Use of packaged energy systems of high efficiency, utilizing gas-fired turbines or engines which produce electrical energy and utilize exhaust heat in application such as heating and cooling.

Total Gross Energy Consumption. Total energy inputs into the economy, including coal, petroleum, natural gas, and the electricity generated by hydroelectric, nuclear, and geothermal power plants. Gross consumption includes conversion losses by the electric power sector.

Total Net Energy Consumption. Inputs into the final consuming sectors, i.e., household and commercial, industrial, and transportation, and consisting of direct fuels and electricity distributed from the electric power sector. Conversion losses in the electric sector constitute the difference between net and gross energy.

Trillion. 1 million million; 10^{12}

UHV. Ultra High Voltage Transmission.

Ultimate Recoverable Reserves. The total quantity of crude oil, natural gas, natural gas liquids or sulfur estimated to be ultimately producible from an oil or gas field as determined by an analysis of current and engineering data. This includes any quantities already produced up to the respective date of the estimate.

Ultra-High-Voltage Transmission (UHC). Transmission of electricity at voltages higher than 800 kV.

Underground Coal Gasification. The proposed process for producing synthetic gas from coal in natural, underground deposits. Western coal deposits 100 or more feet below the surface are the probable target for this technology.

Unfinished Oils. One or more petroleum oils or a mixture or combination of such oils, or any component or components of such oils which are to be further processed.

Unitization. Joining together of several separate leases into a single lease.

Unit Train. A system developed for delivering coal more efficiently in which a string of cars, with distinctive markings, and loaded to "full visible capacity," is operated without service frills or stops along the way for cars to be cut in and out. In this way, the customer receives his coal quickly and the empty car is scheduled back to the coal fields as fast as it came.

Uranium (U). A radioactive element with the atomic number 92 and, as found in natural ores, an average atomic weight of approximately 238. The two principal natural isotopes are uranium-235 (0.7 percent of natural uranium) which is fissionable (capable of being split and thereby releasing energy) and uranium-238 (99.3 percent of natural uranium) which is fertile (having the property of being convertible to a fissionable material). Natural uranium also includes a minute amount of uranium-234.

Uranium Oxide (U_3O_8). (Yellowcake) The international standard for the form in which uranium concentrate is marketed.

USGS. The United States Geological Survey.

Volt. A unit of electrical force equal to that amount of electromotive force that will cause a steady current of one ampere to flow through a resistance of one ohm.

Voltage. The amount of electromotive force, measured in volts, that exists between two points.

Wagon Wheel. An industrial experiment with nuclear explosives that would use sequential firing of several charges to stimulate a natural gas field. The best proposed site is Sublette County, Wyoming.

Wash Plant. A plant in which coal is freed from some of its ash and other impurities, such as inorganic sulfur, in order to produce a higher quality fuel. The separation may be accompanied by a number of processes that generally take advantage of differences in density between pure coal and any contaminating ingredients. A waste product consisting of various amounts of ash, sulfur, water and coal is rejected from a wash plant.

Wastes, Radioactive. Equipment and materials, from nuclear operations, which are radioactive and for which there is no further use. Wastes are generally classified as high-level (having radioactivity concentrations of hundreds to thousands of curies per gallon or cubic foot), low level (in the range of 1 microcurie per gallon or cubic foot), or intermediate.

Waterflooding. A secondary-recovery operation for oil fields in which water is injected into a petroleum reservoir to bring more oil to the surface.

Water Gas. A mixture of gases produced by forcing steam through a very hot coke or coal. It is a mixture of carbon monoxide and hydrogen with small amounts of nitrogen and carbon dioxide and is sometimes used as a fuel for heating and cooking.

Watt. The rate of energy transfer equivalent to one ampere under an electrical pressure of one volt. One watt equals 1/746 horsepower, or one joule per second.

Watt-Hour. The total amount of energy used in one hour by a device that uses one watt of power for continuous operation. Electrical energy is commonly sold by the kilowatt hour (1,000 watt-hours).

Well. Hole drilled for the purpose of finding or producing crude oil or natural gas or providing services related to the production of crude oil or natural gas. Wells are classified as oil wells, gas wells, dry holes, stratigraphic tests, or service wells. This is a standard definition of the American Petroleum Institute.

Well Head. Oil or gas brought to the surface, ready for transportation to refinery or ship or pipeline. Well head costs usually refer to the cost to bring the oil or gas to the surface and do not include costs of transportation, refining, distribution, or profit.

Wheeling. Transmission of electricity by a utility over its lines for another utility; also includes the receipt from and delivery to another system of like amounts but not necessarily the same energy.

Wild Cat. A well drilled in an area which has not produced gas or oil previously; usually exploratory, and often without geophysical investigation. On the average, one of nine or ten wildcat wells strike oil or gas deposits.

WL. Working Level.

WLM. Working Level Month.

WHAT IS A BTU?

A BTU is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit. The BTU is a very small unit of measurement and when one adds up large quantities of energy, one must count in large multiples of the BTU. Thus, the energy balance tables in this report are expressed in trillions (10^{12}) and quadrillions (10^{15}) of BTU's.

The BTU equivalents of common fuels are as follows:

Fuel and Common Measures	*BTU's*
Crude Oil—Barrel (Bbl.)	5, 600, 000
Natural Gas—Cubic Foot (CF)	1, 032
Coal—Ton	13, 000, 000 to 26, 000, 000
Electricity—Kilowatt Hour (KWH)	3, 412

Two trillion BTU's per year are approximately equal to 1,000 barrels per day of crude oil.

LIST OF ABBREVIATIONS

AEC—Atomic Energy Commission
AGA—American Gas Association
API—American Petroleum Institute
BWR—boiling water reactor
CPA—Canadian Petroleum Association
CRG—Catalytic Rich Gas (process)
DCF—discounted cash flow
DWT—deadweight ton
ECCS—emergency core cooling system
EPA—Environmental Protection Agency
FBR—fast breeder reactor
FPC—Federal Power Commission
FRB—Federal Reserve Board Index of Industrial Production
GNP—gross national product
H_2S—hydrogen sulfide
HTGR—high-temperature gas-cooled reactor
ICOP—Imported Crude Oil Processing
KWH—kilowatt hour
LNG—liquefied natural gas
LPG—liquefied petroleum gas
LWR—light-water reactor
MB/D—thousand barrels per day
MCF—thousand cubic feet
MHD—magnetohydrodynamics
MMB/D—million barrels per day
MMCF—million cubic feet
MRG—Methane Rich Gas (process)
MTU—metric tons uranium
MW—megawatt
MWe—megawatt electrical generating capacity
NEB—National Energy Board (Canadian)
NGL—natural gas liquids
NO_x—nitrogen oxides
OCS—Outer Continental Shelf
OIP—oil-in-place
OPEC—Organization of Petroleum Exporting Countries
PAD—Petroleum Administration for Defense
PGC—Potential Gas Committee
Pu—plutonium
PWR—pressurized water reactor
R/P—reserves/production (ratio)
SNG—substitute natural gas
SO_2—sulfur dioxide
SRI—Stanford Research Institute
SWU—separative work units
TCF—trillion cubic feet
TVA—Tennessee Valley Authority
USGS—U.S. Geological Survey
VLCC—very large crude carriers

APPROXIMATE CONVERSION FACTORS FOR CRUDE OIL[1]

From—	Into—						
	Metric tons	Long tons	Short tons	Barrels	Kiloliters (cubic meters)	1,000 gallons (Imperial)	1,000 gallons (U.S.)
	Multiply by—						
Metric tons	1	0.984	1.102	7.33	1.16	0.256	0.308
Long tons	1.016	1	1.120	7.45	1.18	.261	.313
Short tons	.907	.893	1	6.65	1.05	.233	.279
Barrels	.136	.134	.150	1	.159	.035	.042
Kiloliters (cubic meters)	.863	.849	.951	6.29	1	.220	.264
1,000 gallons (Imperial)	3.91	3.83	4.29	28.6	4.55	1	1.201
1,000 gallons (United States)	3.25	3.19	3.58	23.8	3.79	.833	1

[1] Based on world average (excluding natural gas liquids).

CONVERSION FACTORS

To convert—	From— Barrels to metric tons	 Metric tons to barrels	 Barrels/day to tons/year	 Tons/year to barrels/day
	Multiply by—			
Crude oil [1]	0.136	7.33	49.8	0.0201
Gasoline	.118	8.45	43.2	.0232
Kerosene	.128	7.80	46.8	.0214
Diesel fuel	.133	7.50	48.7	.0205
Fuel oil	.149	6.70	54.5	.0184

[1] Based on world average gravity (excluding natural gas liquids).

APPROXIMATE CALORIFIC EQUIVALENTS

One million tons of oil equals approximately—
  Heat Units:
    41 million million BTUs
    415 million therms
    10,500 Teracalories
  Solid Fuels:
    1.5 million tons of coal
    4.9 million tons of lignite
    3.3 million tons of peat
  Natural Gas (1 cu. ft equals 1,000 BTUs) 1 cu. metre equals 9,000 Kcals):
    1.167 thousand million cu. meters
    41.2 thousand million cu. ft.
    113 million cub. ft./day for a year
  Manufactured Gas (1 cu. ft. equals 470 BTUs) (1 cu. meter equals 4,200 Kcals)
    2.5 thousand million cu. meters
    88.3 thousand million cu. ft.
    242 million cu. ft./day for a year
  Electricity (1 Kwh equals 3,412 BTUs) (1 Kwh equals 860 Kcals):
    12 thousand million Kwh

Heat units and other fuels expressed in terms of million tons of oil	*Million tons of oil*
10 million million BTUs approximates to	0.24
100 million therms approximates to	.24
10,000 Teracalories approximates to	.95
1 million tons of coal approximates to	.67
1 million tons of lignite approximates to	.20
1 million tons of peat approximates to	.30
1 thousand million cu. meters approximates to	.86
10 thousand million cu. ft. approximates to	.24
100 million cu. ft./day for a year approximates to	.88
1 thousand million cu. meters approximates to	.40
10 thousand million cu. ft. approximates to	.11
100 million cu. ft./day for a year approximates to	.41
10 thousand million Kwh apprximates to	.82

One million tons of oil produces about 4,000 millions units (Kwh) of electricity in a modern power station.

INTRODUCTION TO INDEX

I. Compactness and completeness are the main aims for this index.

A. Primary energy *sources* in the index entries are Coal, Electricity, Energy, Gas, Nuclear energy, Oil, and Uranium. In addition, there are many secondary energy sources such as Anthracite coal, Distillate, Hydropower, Nuclear reactors, and Shale oil.

B. Primary energy *factors* in the index entries are Consumption (incorporating such terms in the tables as commitments, demand, disposition, inputs, requirements, and use); Production (incorporating such terms in the tables as capacity, generation, outputs, and supply); and Transport (incorporating such terms in the tables as distribution, shipping, and transmission). In addition, there are many secondary energy factors such as Costs, Prices, Reserves, and Resources.

C. Primary breakdown *units* in the index entries are Consumer sector, State, and World. In addition, there are many secondary breakdown units such as Daily average, Electrical sector, and Geographic area (of United States).

D. From these *sources*, *factors*, and *units*, taking Oil, Consumption, and State as examples, the index will give the following entries:

(1) Oil consumption by state
(2) Consumption (of) oil by state
(3) State oil consumption

In order to be compact, the index will *not* give the following entries

(4) Oil state consumption
(5) Consumption by state (of) oil
(6) State consumption (of) oil

E. The entry "Associated-dissolved natural gas liquids reserves by state, 369" implies that only natural gas liquids are classified as associated-dissolved, that only reserves data are given for associated-dissolved natural gas liquids, and that only a state breakdown of data is available for associated-dissolved natural gas liquids reserves. Therefore, only one entry is required.

On the other hand, the set of entries "Nuclear energy, 3, 7, 241–278
consumption, 52, 62
by consumer sector, 58
projection, 50–51"

is required because there are other factors (such as costs and production) under Nuclear energy, because there are other breakdown units (such as electrical sector and geographic area) under consumption, and because there are projected data on pages 50–51 as well as historical data on page 58 for the consumer sector breakdown of the consumption of nuclear energy.

II. The following notes are helpful in using the index.

A. The (of) in entry (2), above, is not included in the index to permit entries like "Production (of) energy" to precede "Production facilities" without two sets of main entries: "Production" and "Production of". In addition, subentries are more easily scanned without a distracting "of".

B. Since this is primarily a study of United States energy data, in most cases it would be redundant to say "U.S. consumption". If a table includes data from countries other than the United States, this has been indicated by the word "world" in the index.

C. In the interest of compactness, no listings for individual states in the United States or countries in the world are given. Pages exclusively devoted to Alaska, Canada, and Mexico are exceptions to this rule.

D. There are indications of *map* or *illus.* where a map or an illustration forms the main content of the page.

E. The term "projection" is used whenever data is projected beyond the present. Frequently, tables marked as projections also include historical and present data.

INDEX

Abandoned oil drilling in Canada, 383
Accident fatality rates, 277–278
Advanced technology, R. & D. funding for, 80
Air:
    pollution control, projection, 88
    quality, 6
        standards for sulfur oxide, particulates, and nitrogen oxides, 89
        See also Environment, Pollution
Air conditioning energy consumption, 53, 59
Alaska oil production, projection, 311
All-rail transport of coal, 136
Anthracite coal:
    consumption, 62
        by consumer sector, 58
    exports:
        to region of world, 100, 102
            value of, 102
    heat values, 37*n*
    production, 37
    reserves, 110
        minable by surface methods, 112
        minable by underground methods, 111
    resources, 110
    See also Coal
Appliance and Auto Efficiency Labelling Act, 8
Appliance efficiency standards, 8
Asphalt:
    heat values, 37*n*
    production, 329
        by P.A.D. district, 330
    stocks, 340
Asphalt and road oil transport, 318–319
Associated-dissolved gas reserves, 196
    by State, 198
Associated-dissolved natural gas liquids reserves by state, 369
Atomic power, *see* Nuclear energy
Auger:
    mines, production of coal by state, 124
    mines, value of coal by state, 172
    mining of coal by district, 120
    mining of coal by state, 119
Auto Efficiency Labelling Act, Appliance and, 8
Auto emission standards, 6
Aviation fuel oil, transport of, 323
Beehive coke plants consumption of coal, 130
Bi-Gas, costs, projection, 152
Bioconversion:
    impact of, projection, 410, 411
    implementation of, projection, 409
    See also Solar energy heating and cooling
Bituminous coal:
    consumption, 47, 62
        by consumer sector, 58
    exports:
        to region of world, 99, 101, 104
            value of, 101, 104
    heat values, 37*n*

Bituminus Coal—Continued
    imports by region of world and customs district, 103
    mining, land use in, 174
    production, 37
        daily averages by state, 123, 124
        by method of loading, 125
        by state, 173
        world, 98
    reserves, 110
        minable by surface methods, 112
        minable by underground methods, 111
    resources, 110
    strip mine characteristics by state, 176
    underground mine characteristics by state, 175
    value per ton by state, 123, 172, 173
Bituminous coal and lignite:
    consumption, 181
        by consumer class, 130
    heat value, 181
    number of mines, 126
    production, 126, 181
        daily average, 117
        by district and mining method, 120
        monthly averages by state, 118
        by state and mining method, 119
    transport:
        by geographic area and state of destination, 137
        by state and railroad, 133–134
        by state and unit train, 135
        by state and waterway, 134
        by sulfur content, consumer use, and district, 138
        by transport method, 136
    See also Bituminous coal, Coal, Lignite
Breeder reactor, R. & D. funding for, 80
    See also Nuclear reactors
Btu taxes, impact on energy consumption and prices, projection, 64
Bunker lake vessel and foreign consumption of bituminous coal and lignite, 130
Bureau of Mines oil refining districts, *map*, 328
Canadian:
    gas drilling, 383
    gas reserves, 188
    oil drilling, 383
        projection, 291
Capacity, *see* Production
Capital investment, *see* Costs
Char-Oil Energy Development, costs, projection, 149
Chemical explosive fracturing, oil production stimulation by, *illus.*, 375
Clean Air Act amendments, 6–7, 8
Clean Power Generation from Coal Project, projection, 148
Clothes drying energy consumption, 59
CO_2 Acceptor, costs, projection, 152
Coal, 95–181
    anthracite, *see* Anthracite coal
    bituminous, *see* Bituminous coal
    Clean Power Generation from, Project, projection, 148
    consumption, 52, 129–130
        by consumer sector, projection, 50–51, 129
    by electrical sector, projection, 61
    by electrical sector by state, 36
    by geographic area, projection for electric generation, 32–34
    growth rates, projection, 54, 55
    impact of Btu taxes on, projection, 64
    projection, 29, 48, 49, 54, 55
    by state, 333
    world, projection, 45, 46
    conversion to methanol, plant costs, 165

Coal—Continued

- conversion to substitute natural gas, 163, 164
- costs:
  - facility, projection, 86
  - of heating using gas and electricity from, projection, 157
  - of operating with, 90
  - projection, 259
- distribution, *map*, 114
- energy consumption, 60
- exports, 30, 105
  - projection, 29
- facility production leadtimes, 87
- gasification, water consumption during, 167
- gasification plants, projection, 156
- to gasoline, energy balance, 160
- H-Coal, costs, projection, 149
- heat rates, 90
- imports, 30
- leasing, 7
- leasing areas, known, *map*, 171
- lignite, *see* Lignite
- liquefaction, water consumption during, 167
- liquid fuels from, costs, projection, 158
- mines, facility production leadtimes, 87
- mines, number of, by state, 123, 124
- mining, fatal injury rate, 177
- mining, nonfatal injury rate, 178
- pipeline costs, 139
- prices:
  - growth rates, projection, 85
  - impact of Btu taxes on, projection, 64
  - projection, 85
- production, 3, 105, 177-126
  - daily average, 38-39
  - on Federal and Indian lands, 121
  - on Federal leases, projection, 122
- *map*, 144
  - projection, 29
  - world, 95
- research activities, R. & D. funding for, 145
- research and development funding for, 81
- reserves, 24, 109-114
  - by geographic area, 109
  - *map*, 114
  - minable by surface methods, 112
  - minable by underground methods, 111
  - by state, 113
  - world, 21, 22, 95-97
- resources, 24, 110
  - world, 21, 95-98
- Solvent Refined, costs, projection, 149
- subbituminous, *see* Subbituminous coal
- synthetic fuels from, 143-167
  - prices, projection, 166
  - *See also* Synthetic fuels
- transport, 133-139
  - costs, 139
- use of domestic, 6

Coal-Oil-Gas (COG) refining process, *illus.*, 154

Coke:

- consumption by state, 333
- plants, consumption of coal by, 130
- production, 329
  - by P.A.D. district, 330
- stocks, 340

Combined oil/gas costs, 144

Commercial sector energy consumption, 59

- *See also* Consumer sector

- Commercial retrofits, projection, 417
- Commercial starts, projection, 416
- Condensate, *see* Lease condensate, Plant condensate
- Conservation:
  - of energy, 5
  - measures for, 8
  - projection, 48, 49
- Consol synthetic fuel process:
  - components of, 161, 162
  - costs, projection, 158
  - products from, 160
  - *See also* Synthetic fuels
- Consumer class, bituminous coal and lignite consumption by, 130
- Consumer sector:
  - anthracite coal consumption, 58
  - bituminous coal consumption, 58
  - coal consumption, projection, 50–51, 129
  - electricity consumption, 58
    - projection, 50–51, 63
  - energy consumption, 57
  - gas:
    - consumption, 58
      - projection, 50–51, 215, 216
      - by state, 218
    - sales, 233, 234
      - by state, 222
  - hydropower consumption, 58
    - projection, 50–51
  - lignite consumption, 58
  - nuclear energy consumption, 58
    - projection, 50–51
  - oil consumption, 58, 313
    - projection, 50–51
  - synthetic gas consumption, projection, 50–51
  - *See also* Commercial sector, Consumer class, Electrical sector, Household and commercial sector, Industrial sector, Residential sector, Transportation sector
- Consumer use and sulfur content of transported coal, 138
- Consumption:
  - anthracite coal, 62
    - by consumer sector, 58
  - bituminous coal, 47, 62
    - by consumer sector, 58
  - bituminous coal and lignite, 181
    - by consumer class, 130
  - coal, 52, 129–130
    - by consumer sector, projection, 50–51, 129
    - by electrical sector, projection, 61
    - by electrical sector by state, 36
    - by geographic area, projection for electric generation, 32–34
    - growth rates, projection, 54, 55
    - impact of Btu taxes on, projection, 64
    - projection, 29, 48, 49, 54, 55
    - by state, 333
    - world, projection, 45, 46
  - coke by state, 333
  - distillate fuel oil, 312
    - projection, 310
    - by state, 333
  - electricity, 62
    - by consumer sector, 58
      - projection, 50–51, 63
    - growth rates, projection, 54, 55
    - impact of Btu taxes on, projection, 64
    - projection, 54, 55, 64
    - by state, 333
    - world, 28

Consumption—Continued
  energy, 3, 47–67
    by consumer sector, 57
    by electrical sector, world, projection, 28
    and employment, projection, 74
    by energy use, 53
    and Gross National Product, projection, 72, 73
    by household and commercial sector, 59
    per capita, 56
      projection, 72
    projection, 29
    by transportation sector, 60
    world, 43–46
      projection, 43, 44
      relative to Gross National Product growth, 71
  fossil fuels:
    by electrical sector, world, projection, 28
    by geographic area, projection for electric generation, 32
  gas, 47, 52, 62, 208, 213–222, 237
    by consumer sector, 58
      projection, 50–51, 215, 216
    for electric generation by state, 219
    by electrical sector, projection, 61
    by electrical sector by state, 36
    by geographic area, projection for electric generation, 32–34
    and Gross National Product, projection, 75
    growth rates, projection, 54, 55
    for househeating, projection, 220
    for househeating by state, 221
    impact of Btu taxes on, projection, 64
    by industry type, 213
    per capita, 56
    projection, 29, 48, 49, 54, 55
    refinery, by state, 333
    by state, 217, 333
    by state and consumer sector, 218
    world, projection, 45, 46
  gasoline, 312
    projection, 310
  geothermal energy:
    by electrical sector, world, projection, 28
    projection, 48, 49
    world, projection, 45, 46
  hydropower, 52, 62
    by consumer sector, 58
      projection, 50–51
    by electrical sector, projection, 61
    by electrical sector, world, projection, 28
    by geographic area, projection for electric generation, 33–34
    growth rates, projection, 55
    projection, 48, 49, 55
    world, projection, 45, 46
  jet fuel, 312
  kerosine, projection, 310
  lignite, 62
    by consumer sector, 58
  liquefied gas by state, 333
  natural gas liquids, 62
  nuclear energy, 52, 62
    by consumer sector, 58
      projection, 50–51
    by electrical sector, projection, 61
    by electrical sector by state, 36
    by electrical sector, world projection, 23
    by geographic area, projection for electric generation, 33–34
    growth rates, projection, 55
    projection, 48, 49, 55
    world projection, 45, 46

Consumption—Continued
    oil, 3, 10, 47, 52, 62, 309–310, 312–313
        by consumer sector, 58, 313
            projection, 50–51
        daily average, 309
        by electrical sector, projection, 61
        by electrical sector by state, 36
        by geographic area, projection for electric generation, 32–34
        growth rates, projection, 54, 55
        impact of Btu taxes on, projection, 64
        by P.A.D. district, 307
        by product, 312
        projection, 29, 48, 49, 54, 55, 288, 310
        by state, 333
        world, projection, 45, 46
    purchased steam by state, 333
    residual fuel oil, 312
        projection, 310
        by state, 333
    shale oil, 404
    synthetic gas:
        by consumer sector, projection, 50–51
        projection, 54, 55
    thermal energy by electrical sector by state, 36
    uranium, world, projection, 426, 427, 438, 457–463, 466
    water, in refining and conversion processes, 167
    See also Consumer sector
Control of effluents, R. & D. funding for, 81
Conversion efficiency, *see under* Efficiency
Conversion table, gas, 238
Conveyor transport of coal, 136
Cooking energy consumption, 59
Cooling and electrolytic processes energy consumption, 53
Core drilling tests by state, 387
Costs:
    coal:
        facility, projection, 86
        operating with, 90
        pipeline, 139
        projection, 259
        -to-methanol plant, 165
        transport, 139
    combined oil/gas, 144
    Consol synthetic fuel process, 161, 162
        projection, 158
    distillate mix, 144
    electric transmission facility, projection, 86
    electricity transport, 139
    energy facilities, projection, 86
    fluidized bed processes, projection, 146
    gas:
        drilling, 392, 393
        facility, projection, 86
    gasoline, 405
    heating using gas and electricity from coal, projection, 157
    high-Btu processes, projection, 152
    hydrocarbon research process, projection, 158
    liquid boiler fuel, 144
    liquid conversion processes, projection, 149
    low-Btu processes, projection, 150
    low-Btu utility gas, 144
    magnetohydrodynamics projects, projection, 148
    nuclear energy, projection, 259
    nuclear energy facility, projection, 86
    nuclear reactors, projection, 258

Costs—Continued
    oil, 345-352
        drilling, 392, 393
        facility, projection, 86
    oilfield tubular goods, projection, 351
    pipeline gas, 144
    shale oil, 405
    synthetic fuels, 144
        projection, 155
    synthetic gas facility, projection, 86
    transport by unit train, 139
    transportation facility, projection, 86
    uranium, 433, 434, 437, 438, 450, 451, 454
        projection, 452-454
Crude oil, *see* Oil
Customs district imports of bituminous coal by region of world, 103
Daily average:
    bituminous coal production by state, 123, 124
    bituminous coal and lignite production, 117
    coal production, 38-39
    fossil fuels production, 38-39
    gas production, 38-39
    lease condensate production, 38-39, 309
    lignite production by state, 123, 124
    natural gas liquids production, 38-39, 309
    oil:
        consumption, 309
        exports, 309
            world, 287
        imports, 309
            world, 285, 286
        production, 38-39, 304, 309
            by state, 306
            world, 284
    uranium production, 449
Deep-pool tests, oil drilling activity by state, 364
Delivery commitments for uranium, projection, 464
Demand, *see* Consumption
Development wells drilled by state, 388
Developmental oil drilling by state, 362
Diffusion plant operations, nuclear, projection, 266
Direct heat energy consumption, 53
Discovery rates of uranium, projection, 475
Distillate:
    consumption, 312
    energy consumption, 60
    fuel oil:
        consumption, projection, 310
        consumption by state, 333
        production, 329
            by P.A.D. district, 330
        sales by P.A.D. district and state, 346
        stocks, 340
        transport, 317-321
    heat values, 37*n*
    heating oil sales by P.A.D. district and state, 347
    mix costs, 144
    prices, projection, 166
Distribution of coal, map, 114
Distribution gas mains, 225, 226
Distribution, *see also* Transport
District:
    bituminous coal and lignite production by mining method, 120
    coal transport by sulfur content and consumer use, 138

- Drilling:
  - for gas, 386–390
    - in Canada, 383
    - costs of, 392, 393
    - in Mexico, 384
    - and wells, 383–393
  - for oil, 361–366, 386–390
    - in Canada, 383
      - projection, 291
    - costs, 392, 393
    - in Mexico, 384
      - *map*, 361
    - offshore costs, 393
    - price indexes for equipment for, 350
    - projection, 288
    - by state, 362, 364, 366
    - and wells, 383–393
      - by depth by state, 365
    - world, projection, 290
  - rigs, number of oil, by state, 352
  - for uranium, 440, 441, 473–475
  - projection, 475
    - by state, 474
    - surface, 474
- Dry holes:
  - drilling costs, 392, 393
  - in Mexico, 384
  - projection, 288
  - by state, 362, 364, 386, 388–390
- Dry natural gas, *see* Gas
- Efficiency:
  - conversion, of synthetic fuels, projection, 155
  - of energy utilization, projection, 66, 67
  - fuel, 6
    - for autos, 8
  - recovery, of oil, 373
  - standards, appliance, 8
  - thermal, 21
    - for homes, 8
- Efficiency Labelling Act, Appliance and Auto, 8
- Effluents, control of, R. & D. funding for, 81
- Electric drive energy consumption, 53
- Electric power, *see* Electricity
- Electric utilities, 7
- Electrical sector:
  - coal consumption, projection, 61
  - coal consumption by state, 36
  - energy consumption, world, projection, 28
  - fossil fuels consumption, world, projection, 28
  - gas consumption, projection, 61
  - gas consumption by state, 36
  - geothermal consumption, world, projection, 28
  - hydropower consumption, projection, 61
    - world, 28
  - nuclear energy consumption, projection, 61
    - world, 28
  - nuclear energy consumption by state, 36
  - oil consumption, projection, 61
  - oil consumption by state, 36
  - thermal energy consumption by state, 36
  - *See also* Consumer sector
- Electricity:
  - from coal, costs, projected, 157
  - consumption, 62
    - of bituminous coal and lignite, 130
    - by consumer sector, 58
      - projection, 50–51, 63

- Electricity—Continued
  - Consumption—Continued
    - growth rates, projection, 54, 55
    - impact of Btu taxes on, projection, 64
    - projection, 54, 55, 64
    - by state, 333
    - world, 28
  - costs of facility, projection, 86
  - costs of transport, 139
  - emission standard guidelines, 89
  - facility costs, projection, 86
  - facility production leadtimes, 87
  - generated by nuclear energy, world, 241
  - generation, 28
    - from coal, R. & D. funding, projection, 145
    - coal consumption for, by geographic area, projection, 32–34
    - fossil fuel consumption for, by geographic area, projection, 32
    - gas consumption for, by geographic area, projection, 32–34
    - gas consumption for, by state, 219
    - hydropower consumption for, by geographic area, projection, 33–43
      - by low-Btu gas process, *illus.*, 151
      - nuclear energy consumption for, by geographic area, projection, 33–34
      - oil consumption for, by geographic area, projection, 32–34
      - pumping energy by geographic area, projection, 33–34
  - nuclear, R. & D. funding for, 81
  - prices, 234
    - growth rates, projection, 85
    - impact of Btu taxes on, projection, 64
    - projection, 85
  - production, 37
    - world, 27
  - R. & D. funding for, 81
  - transmission costs, facility, projection, 86
  - transport costs, 139
  - utility, energy consumption by, 60
- Elk Hills Naval Petroleum Reserve, 5
- Embargo, oil, 3, 4
- Emission standard guidelines for electric utilities, 89
- Emission standards, auto, 6
- Employment and energy consumption, projection, 74
- Energy, 19–1
  - balance:
    - coal to gasoline, 160
    - coal to substitute natural gas, 163
    - shale oil, 404
  - conservation, 5
    - measures, 8
    - projection, 48, 49
  - consumption, 3, 47–67
    - by consumer sector, 57
    - by electrical sector, world, projection, 28
    - and employment, projection, 74
    - by energy use, 53
    - and Gross National Product, projection, 72, 73
    - by household and commercial sector, 59
    - per capita, 56
      - projection, 72
    - projection, 29
    - by transportation sector, 60
    - world, 43–46
      - projection, 43, 44
      - relative to Gross National Product growth, 71
  - exports, 30
    - projection, 29
  - facility costs, projection, 86
  - and Gross National Product, 71–75

Energy—Continued
  imports, 30
    projection, 29
  independence, 4, 15
  inputs, *see* Consumption, Production
  outlook, 3-4
  policy goals, national, 4
  prices, projection, 85
  production, 29-39
    facilities, thermal and hydraulic, projection, 35
    by geographic area, *map*, 31
    per capita, world, 27
    projection, 29
    world, 27-28
  program, Gerald R. Ford's, 357, 379
  pumping, by geographic area, projection for electric generation, 33-34
  and research and development, 79-81
  reserves, 24
    world, 19-22
  resources, 24
    world, 19-24
  self-sufficiency in, by 1980, 15
  use, energy consumption by, 53
  utilization, efficiency of, projection, 66, 67
Energy Facilities Siting, 7-8
Energy Reorganization Act, 15
Energy Research and Development Administration, 9, 15-16
Energy Resources Council, 15, 16
  study, 7
Energy Supply and Environmental Coordination Act, 6
Energy supply regions, *map*, 31
Entrained Bed Atmospheric Gasification System, costs, projection, 150
Entrained Bed Gasifier, costs, projection, 150
Environment, 4, 7
  control, R. & D. obligations for, projection, 79
  oil refineries blocked by, considerations, 332
  See also Air *Entries*, Water pollution
Ethane:
  production, 329
    by P.A.D. district, 330
  stocks, 340
Exploration, uranium, projection, 450, 451, 454
Exploratory oil drilling, by state, 362, 364
Exploratory wells drilled by state, 388
Exports:
  anthracite coal:
    to region of world, 100, 102
      value of, 102
  bituminous coal:
    to region of world, 99, 101, 104
      value of, 101, 104
  coal, 30, 105
    projection, 29
  energy, 30
    projection, 29
  gas, 30, 190
    projection, 29
  oil, 30
    daily average, 309
      world, 287
    earnings, 11
    by P.A.D. district, 307
    projection, 29, 288, 310
Facility, energy, costs, projection, 86
Facility production, leadtimes for, 87
Fatal injury rate in coal mining, 177
Fatality rates for nuclear reactors, and accidents, 277-278

Federal lands, coal production on, 121
Federal leases, coal production on, projection, 122
Federal Power Commission definition of power supply regions, *map*, 31
Feedstock, petrochemical, *see* Petrochemical feedstocks
Feedstocks energy consumption, 53
Field and gathering gas mains, 225, 226
Fluidized Bed Combustion, costs, projection, 146
Fluidized Bed Pressure Gasification System, costs, projection, 150
Fluidized Bed Processes, costs, projection, 146
Ford, Gerald R., 1975 State of the Union address, 3–11
  energy program, 357, 379
Forecasts, *see* projections *under headings*
Fossil fuels:
  consumption by electrical sector, world, projection, 28
  consumption by geographical area, projection for electric generation, 32
  production daily averages, 38–39
  research and development, 9
    obligations, projection, 79
  reserves, world, 22
  water consumption in conversion processes, 167
  See also Coal, Gas, Oil
Fracturing, chemical explosive, oil production by, *illus.*, 375
Fracturing, hydraulic, oil production by, *illus.*, 374
Fuel, jet, *see* Jet Fuel
Fuel oil:
  sales by state by P.A.D. district, 349
  stocks by sulfur content by P.A.D. district, 341
    See also Oil, Residual fuel oil
Fuel savings using solar energy, projection, 415–417
Fusion confinement, R. & D. funding for, 80
Fusion laser, R. & D. funding for, 80
Gas, 185–238
  associated-dissolved, reserves, 196
    by state, 198
  associated-dissolved natural, liquids reserves by state, 369
  Bi-Gas, costs, projection, 152
  Clean-up Using Dolomite, High Temperature, costs, projection, 150
  from coal, costs, projected, 157
  consumption, 47, 52, 62, 208, 213–222, 237
    by consumer sector, 58
      projection, 50–51, 215, 216
      by state, 218
    for electric generation by state, 219
    by electrical sector, projection, 61
    by electrical sector by state, 36
    by geographic area, projection for electric generation, 32–34
    and Gross National Product, projection, 75
    growth rates, projection, 54, 55
    for househeating, projection, 220
    for househeating by state, 221
    impact of Btu taxes on, projection, 64
      by industry type, 213
    per capita, 56
    projection, 29, 48, 49, 54, 55
    by state, 217, 333
      by consumer sector, 238
    world, projection, 45, 46
  conversion table, 238
  costs, facility, projection, 86
  deregulation, 5
  drilling, 386–390
    in Canada, 383
    costs, 392, 393
    in Mexico, 384
  energy consumption, 60
  excise tax, 5
  exports, 30, 190
    projection, 29

Gas—Continued
    high-Btu, *see* High-Btu gas
    Hygas, costs, projection, 152
    imports, 30, 190, 191
        projection, 29
    intermediate-Btu, *see* Intermediate-Btu gos
    liquefied, production and consumption, 237
    liquids, natural, *see* Natural gas liquids
    low-Btu, *see* Low Btu gas
    mains, 225
    natural, *listed as* Gas
    natural, liquids, *see* Natural gas liquids
    nonassociated, reserves, 196
        by state, 198
    nonassociated natural, liquids reserves by state, 369
    pipeline, costs, 144
    pools, number of, 229
    prices, 208, 234–236, 379
        growth rates, projection, 85
        impact of Btu taxes on, projection, 64
        projection, 85
    process, low-Btu, for electric power generation, *illus.*, 151
    processes, high-Btu, *illus.*, 153
    Producer, Stirred Fixed Bed, costs, projection, 150
    production, 37, 191, 195, 197, 200, 203–209, 237
        daily average, 38–39
        projection, 29
        by state, 209
            gross, 204
            net, 205
        world, 185, 189
    projects, high-Btu, projection, 156
    refinery, consumption by state, 333
    research and development funding for, 81
    reserves, 24, 195–200, 369
        in Canada, 188
        estimates, 197
        by state, 198
        world, 21, 22, 185–187
    resources, 24
        undiscovered, projection, 199
        world, 21, 185, 186
    sales:
        by consumer sector, 233, 234
        by state, 222
        by industry type, 214
    scrubbers, stack, 6
    shortages, 3
    still, production, 329
        by P.A.D. district, 330
    storage, 229–230
        by state, 230
    substitute natural, production and consumption, 237
        See also Synthetic gas
    synthetic, *see* Synthetic gas, Synthetic fuels
    transport, 225–226
        by state, 209, 226
    in underground storage by state, 198
    utility, low-Btu, costs, 144
    wells:
        completions of, 385
        costs, 392, 393
        production, 208
        projection, 288
        by state, 203, 206, 207, 386, 388–390
            projection, 391
Gas and oil wells, drilling, 383–393

- Gas-cooled fast breeder reactor, R. & D. funding for, 80
- Gas-cooled nuclear reactor characteristics, 269
- Gasification plants, coal, projection, 156
- Gasoline:
  - aviation, stocks of, 340
  - aviation, transport of, 323
  - coal to, energy balance, 160
  - consumption, 312
    - projection, 310
  - costs, 405
  - energy consumption, 60
  - heat values, 37*n*
  - motor, stocks, 340
  - prices, projection, 357
  - production, 329
  - Project, 149
  - rationing, 9
  - transport, 317–321
- Generation of energy, *see* Production
- Geographic area (of United States):
  - bituminous coal and lignite transport by state of destination, 137
  - coal:
    - consumption, projection for electric generation, 32–34
    - distribution, *map*, 114
    - production, *map*, 114
    - reserves, 109
      - *Map*, 114
  - energy production, *map* 31
  - fossil fuel consumption, projection for electric generation, 32
  - gas consumption, projection for electric generation, 32–34
  - geothermal resources, *map* 91
  - hydropower consumption, projection for electric generation, 33–34
  - known coal leasing areas, *map*, 171
  - nuclear energy consumption, projection for electric generation, 33–34
  - nuclear energy production, *map*, 245
  - oil consumption, projection for electric generation, 32–34
  - oil production, projection, 311
  - pumping energy, projection for electric generation, 33–34
  - uranium mining districts, *map*, 448
  - *See also* State
- Geothermal:
  - consumption:
    - projection, 48, 49
      - world, 45, 46
        - by electrical sector, 28
  - facility production leadtimes, 87
  - research and development, 9
    - funding for, 80, 81
    - obligations, projection, 79
  - reserves, 24
  - resources, 24
    - *map*, 91
  - water consumption in conversion processes, 167
- Glossary, 479
- GNP, *see* Gross National Product
- Great Lakes transport of coal, 136
- Great Lakes transport of oil products, 321
- Green River Formation, shale oil deposits, *map*, 398
- Gross gas production, world, 189
- Gross National Product:
  - and energy, 71–75
  - and energy consumption, projection, 72, 73
  - and gas consumption, projection, 75
  - growth, world energy consumption relative to, 71
    - projection, 72
- Growth rates of energy consumption, projection, 54, 55
- Growth rates for fuel prices, projection, 85

- Hand-loaded production of coal, by state, 125
- H-Coal, costs, projection, 149
- Heat, direct, energy consumption, 53
- Heat rates, coal, 90
- Heat values, 37*n*
  - bituminous and lignite coal, 181
- Heating, space, energy consumption, 53, 59
- Heating, water, energy consumption, 53, 59
- Heating oil:
  - distillate, *see under* Distillate
  - residual, *see* Residual heating oil
  - *See also* Oil
- High-Btu gas:
  - costs, projection, 155
  - prices, projection, 166
  - processes, costs, projection, 152
  - processes, *illus.*, 153
  - projects, projection, 156
- High-Temperature Cleanup with molten salt, costs, projection, 150
- High-Temperature Gas Clean-up Using Dolomite, costs, projection, 150
- High-temperature gas reactor, R. & D. funding for, 80
- Holes, dry, *see* Dry holes
- Househeating, gas consumption for, projection, 220
- Househeating, gas consumption for, by state, 221
- Household and commercial sector energy consumption, 59
  - *See also* Consumer sector
- Housing starts, projection, 415
- Hydraulic energy production facilities, projection, 35
- Hydraulic fracturing, oil production by, *illus.*, 374
- Hydrocarbon research process, costs, projection, 158
- Hydroelectric power, *see* Hydropower
- Hydropower:
  - consumption, 52, 62
    - by consumer sector, 58
      - projection, 50–51
    - by electrical sector, projection, 61
      - world, 28
    - by geographic area, projection for electric generation, 33–34
    - growth rates, projection, 55
    - projection, 48, 49, 55
    - world, projection, 45, 46
  - facility production leadtimes, 87
  - production, 37
    - world, 23
- Hygas, costs, projection, 152
- Imports:
  - bituminous coal by region of world and customs district, 103
  - coal, 30
  - energy, 30
    - projection, 29
  - gas, 30, 190, 191
    - projection, 29
  - oil, 3, 4, 10, 30, 299
    - daily average, 309
    - fees for, 4–5
    - by P.A.D. district, 397
    - projection, 29, 288
    - world, daily average, 285, 286
    - world source of, 289
  - residual fuel oil, world, by sulfur content, 355–356
  - uranium, projection, 429
- Incomes, *see* Costs, Prices
- Independent companies, oil drillings by state, 363
- Index of Industrial Production, 56
- Indian lands, coal production on, 121
- Industrial Production, Index of, 56

- Industrial sector energy consumption, 58
  - *See also* Consumer sector
- Industry capacity factor for nuclear reactors, 247
- Industry-type gas consumption, 213
- Industry-type gas sales, 214
- Inputs, *see* Consumption, Production
- Intermediate-Btu gas prices, projection, 166
- International Energy Agency, 11
- International Energy Program, 9
- International Monetary Fund, 11
- Inventories of uranium and plutonium, 273
- Jet fuel:
  - energy consumption, 60, 312
  - production, 329
    - by P.A.D. district, 330
  - stocks, 340
  - transport, 317–321, 323
- Kerosine:
  - consumption, projection, 310
  - heat values, 37*n*
  - production, 329
    - by P.A.D. district, 330
  - stocks, 340
  - transport, 317–321
- Koppers-Totzek Gasification process, 165
- Land impacts, shale oil production, projection, 403
- Land reclamation, 7
- Land reclamation pollution control, projection, 88
- Land use in bituminous coal mining, 174
- Laser, fusion, R. & D. funding for, 80
- Leadtimes for:
  - energy facility production, 87
  - nuclear reacctor construction, 251
  - nuclear reactor licensing, 250
  - shale oil production, 402
- Lease condensate:
  - production, daily average, 38–39. 309
  - *See also* Oil
- Leasing areas, known coal, *map*, 171
- Licensing, nuclear reactor, leadtimes for, 250
- Light water self-sustaining reactor, R. & D. funding for, 90
- Lighting energy consumption, 53
- Lignite:
  - consumption, 62
    - by consumer sector, 58
  - heat values, 37*n*
  - production, 37
    - by state, 173
      - daily average, 123, 124
    - world, 98
  - reserves, 110
    - minable by surface methods, 112
  - resources, 110
  - value by state, 123, 172, 173
  - *See also* Bituminous coal and lignite, Coal
- Liquefied gas:
  - consumption by state, 333
  - energy consumption, 60
  - production, 329
    - by P.A.D. district, 330
  - production and consumption, 237
  - transport, 318–319
- Liquid boiler fuel costs, 144
- Liquid conversion processes, costs, projection, 149
- Liquid fuels from coal, costs, projection, 158

- Liquid hydrocarbons, *see* Oil
- Liquid metal fast breeder reactor, R. & D. funding for, 80
- Loading methods at underground bituminous coal mines, 125
- Low-Btu gas:
  - costs, projection, 155
  - prices, projection, 166
  - process for electric power generation, *illus.*, 151
  - processes, costs, projection, 150
  - utility gas, costs, 144
- Low-Income Energy Conservation Program, 8
- Lower 48 oil production, projection, 311
- Lubes and waxes energy consumption, 60
- Lubricants:
  - heat values, 37*n*
  - production, 329
    - by P.A.D. district, 330
  - stocks, 340
  - transport, 318–319
- Magnetohydrodynamics conversion process, *illus.*, 147
- Magnetohydrodynamics projects, costs, projection, 148
- Major companies, oil drillings by state, 363
- Man-days worked in coal mines, by state, 123, 124
- Marketed gas production, world, 189
- Mechanically loaded production of coal by state, 125
- Methyl alcohol, costs, projection, 155
- Mexican gas drilling, 384
- Mexican oil drilling, 384
  - *map*, 361
- MHD, *see* Magnetohydrodynamics
- Mill size, uranium, 453
- Mineral fuels, *see* Coal, Gas, Oil
- Mines:
  - coal, facility production lead times, 87
  - number of bituminous coal and lignite, 126
  - *number of coal, by state, 123, 124*
  - *uranium, 446*
- Mining bill, surface, 7
- Mining bituminous coal, land use in, 174
- Mining coal:
  - fatal injury rate, 177
  - by method and district, 120
  - by method and state, 119
  - nonfatal injury rate, 178
- Mining districts, uranium, *map*, 448
- Mining technology, R. & D. funding, projection, 145
- Monthly averages for bituminous coal and lignite production by state, 118
- Multicell Fluidized Bed Boiler, costs, projection, 146
- Multiprocess Plant, costs, projection, 149
- Naphthas:
  - production, 329
    - by P.A.D. district, 330
  - stocks, 340
- Natural gas, *listed as* Gas
- Natural gas liquids:
  - consumption, 62
  - heat values, 37*n*
  - production, 197
    - daily average, 38–39, 309
    - by P.A.D. district, 330
  - projection, 288, 310
  - reserves, 296, 369
    - estimates, 197
    - by state, 369
    - world, 21
  - resources, world, 21
  - transport, 317–321
  - *See also* Gas, Oil
- Naval Petroleum Reserve No. 4, 6
- New-field wildcat wells drilled by state, 364, 390

NGL, *see* Natural gas liquids
Nitrogen oxides air quality standards, 89
Nonassociated gas reserves, 196
    by state, 198
Nonassociated natural gas liquids reserves by state, 369
Nonfatal injury rate in coal mining, 178
North Slope oil production, projection, 311
Nuclear diffusion plant operations, projection, 266
Nuclear electricity, R. & D. funding for, 81
Nuclear energy, 3, 7, 241–278
    consumption, 52, 62
        by consumer sector, 58
            projection, 50–51
        by electrical sector, projection, 61
            world, 28
        by electrical sector by state, 36
        by geographic area, projection for electric generation, 33–34
        growth rates, projection, 55
        projection, 48, 49, 55
        world, projection, 45, 46
    costs, projection, 259
        facility, 86
    facility production leadtimes, 87
    with firm uranium supply arrangements, 468
    industry capacity factor, 247
    pollution control, projection, 88
    production, 37, 247
        map, 245
        projection, 249
        world, 241
    research and development, 9
        funding for, 80
        obligations, projection, 79
    station status, projection, 246
    uranium requirements for, projection, 469
    water consumption in conversion processes, 167
    See also Plutonium, Uranium
Nuclear Facility Licensing Act, 7
Nuclear fuel cycle, 257–269
    illus., 257
    interrelationships, 265
    light water reactor, *illus.*, 262
    and nuclear reactors, 263
Nuclear fusion research and development, 9
Nuclear power, *see* Nuclear energy
Nuclear reactor(s), 241–252
    cost, projection, 258
    fatality rates, 277–278
    gas cooled, characteristics, 269
    leadtime for constructing, 251
    licensing, leadtime, 250
    light-water, *illus.*, 268
    locations of, *map*, 245
    in the nuclear fuel cycle, 263
    number of, 247
        projection, 248
        world, 241
    pollution control, projection, 88
    projection, 252
    R. & D. funding for, 80
    station status, projection, 246
    uranium requirements, projection, 253
Nuclear Regulatory Commission, 15
Nuclear safety, R&D funding for, 80
Nuclear separative work commitments, projection, 267

- Ocean thermal energy:
  - impact of, projection, 410. 411
  - implementation of, projection, 409
  - *See also* Solar energy heating and cooling
- Offshore oil drilling costs, 393
- Ohio River transport of oil products, 321
- Oil, 281–366
  - administration for defense (P.A.D.) districts, *map*, 328
  - aviation fuel, transport of, 323
  - consumption, 3, 10, 47, 52, 62
    - by consumer sector, 58, 313
      - projection, 50–51
    - daily average, 309
    - by electrical sector, projection, 61
    - by electrical sector by state, 36
    - by geographic area, projection for electric generation, 32–34
    - growth rates, projection, 54, 55
    - impact of Btu taxes on, projection, 64
    - by P.A.D. district, 307
    - by product, 312
    - projection, 29, 48, 49, 54, 55, 288, 310
    - by state, 333
    - world, projection, 45, 46
  - costs, 345–352
    - facility, projection, 86
  - crude, *listed as* Oil
  - distillate heating, *see under* Distillate
  - drilling, 361–366, 386–390
    - in Canada, 383
      - projection, 291
    - costs, 392, 393
    - by depth of well by state, 365
    - in Mexico, 384
      - *map*, 361
    - offshore costs, 393
    - price index for equipment, 350
    - projection, 288
    - rigs, number of, by state, 352
    - by state, 362, 364
      - projection, 366
    - world, projection, 290
  - dry holes, projection, 288
  - embargo, 3, 4
  - enhanced recovery of, *illus.*, 373
  - excise tax on, 5, 379
  - exports, 30
    - daily average, 309
    - world, 287
    - earnings, 11
    - by P.A.D. district, 307
    - projection, 29, 288, 310
  - facility production leadtimes, 87
  - fuel, *see* Fuel oil
  - imports, 3, 4, 10, 30, 299
    - daily average, 309
    - fees, 4–5
    - by P.A.D. district, 307
    - projection, 29, 288
    - world, daily average, 285, 286
    - world source of, 289
  - prices, 10–11, 234, 379
    - changes of, 345
    - decontrol of, 5
    - growth rates of, projection, 85
    - impact of Btu taxes on, projection, 64
    - projection, 85
    - world, reduction in, 4

Oil—Continued
  production, 3, 37, 297, 299, 303-311, 329
    daily average, 38-39, 304, 309
      by state, 306
    by geographic area, projection, 311
    by P.A.D. district, 307, 330, 331
      by state, 303
      by sulfur content, 334
    projection, 29, 288, 310
    by state, 298
      by P.A.D. district, 303
    stimulation by chemical explosive fracturing, *illus.*, 375
    stimulation by massive hydraulic fracturing, *illus.*, 374
    by sulfur content by P.A.D. district, 334
    world, 281
      daily average, 284
  products, production of, 329
    by P.A.D. district, 330
  products, stocks of, 340
  refineries blocked on environmental grounds, 332
  refining, 327-334
    districts, Bureau of Mines, *map*, 328
    by P.A.D. district and state, 327
    water consumption during, 167
    world, 292
  reliance on foreign sources of, 3
  R. & D. funding for, 81
  reserves, 24, 295-298, 369
    Elk Hills Naval Petroleum Reserve, 5
    Naval Petroleum Reserve No. 4, 6
    by state, 295, 298
    world, 21, 22, 281-283
  residual fuel, *see* Residual fuel oil
  residual heating, *see* Residual heating oil
  resources, 24
    world, 21, 281, 282
  revenue from excise tax on, 379
  road, *see* Road oil
  shale, *see* Shale oil
  stocks, 337-341
    by P.A.D. district, 307, 340
    by state of location, 338, 339
    by state of origin, 337
  storage, 9
  Synthoil, costs, projection, 149
  tax on, excise, 5, 379
  transport, 317-323
    via Great Lakes and Ohio River, 321
    by oil product, 317
      by P.A.D. district, 318-323
  wells:
    completed, 304, 385
    costs, 392, 393
    drilling, projection, 290
    drilling in Canada, 291
    production, 208
    projection, 288
    by state, 308, 363, 364, 386, 388-390
      projection, 391
    wildcat, projection, 288
  See also Shale oil
Oil and gas wells, drilling, 383-393
Oil/gas, combined, costs, 144
Oilfield tubular goods, costs, projection, 351
Old Oil Entitlements program, 5
OPEC, *see* Organization of Petroleum Exporting Countries
Open pit uranium mines, 446

- Organization of Petroleum Exporting Countries (OPEC), 10
  - prices, 3, 379
- Outer Continental Shelf leasing policy, 6
- Outer Continental Shelf oil production, projection, 311
- Outposts, oil drilling activity by state, 364
- Output, *see* Production
- Oven coke plants consumption of coal, 130
- P.A.D., *see* Petroleum Administration for Defense
- Particulates air quality standards, 89
- Per capita:
  - energy:
    - consumption, 56
      - projection, 72
    - production, world, 27
  - gas consumption, 56
- Petrochemical feedstocks:
  - production, 329
    - by P.A.D. district, 330
  - stocks, 340
  - transport, 318–319
- Petroleum, *see* Oil
- Petroleum Administration for Defense (P.A.D.) district(s):
  - distillate fuel oil sales by state, 346
  - distillate heating oil sales by state, 347
  - fuel oil sales by state, 349
  - fuel oil stocks by sulfur content, 341
  - *map*, 328
  - natural gas liquids production, 330
  - oil:
    - consumption, 307
    - exports, 307
    - imports, 307
    - production, 307, 331
      - by state, 303
      - by sulfur content, 334
    - products, production of, 320
    - refining by state, 327
    - stocks, 307, 340
    - transport by oil product, 318–323
  - residual fuel oil sales by state, 346
  - residual heating oil sales by state, 348
- Photosynthetic energy production, projection, 409
- Photovoltaic energy:
  - impact of, projection, 410, 411
  - implementation of, projection, 409
  - *See also* Solar energy heating and cooling
- Pipeline, coal, costs, 139
- Pipeline gas costs, 144
- Plant condensate production by P.A.D. district, 330
- Plutonium:
  - credit, 259
  - inventories, 273
  - in the nuclear fuel cycle, *illus.*, 262
  - and nuclear fuel cycle interrelationships, 265
  - *See also* Nuclear energy, Uranium
- Pollution:
  - abatement, R. & D. funding, projection, 145
  - control equipment, 7
  - control expenditures, projection, 88
  - *See also* Air *entries*, Environment, Water pollution
- Pools, gas, number of, 229
- Population data, *see* Per capita
- Power, *see* Energy
- Power supply regions, *map*, 31

- Price(s):
  - changes, oil, 345
  - coal:
    - growth rates, projection, 85
    - impact of Btu taxes on, projection, 64
    - projection, 85
  - distillate, projection, 166
  - electricity, 234
    - growth rates, projection, 85
    - impact of Btu taxes on, projection, 64
    - projection, 85
  - energy, projection, 85
  - gas, 208, 234–236, 379
    - growth rates, projection, 85
    - impact of Btu taxes on, projection, 64
    - projection, 85, 166
  - gasoline, projection, 357
  - high-Btu gas, projection, 166
  - indexes for drilling equipment, 350
  - intermediate-Btu gas, projection, 166
  - low-Btu gas, projection, 166
  - oil, 10–11, 234, 379
    - changes, 345
    - decontrol, 5
    - growth rates, projection, 85
    - impact of Btu taxes on, projection, 64
    - projection, 85
    - world, reduction in, 4
  - OPEC, 3, 379
  - for synthetic fuels from coal, projection, 166
  - uranium, projection, 465
- Private railroad transport of coal, 136
- Process steam energy use, 53
- Process yield from SASOL process, 159
- Production:
  - anthracite coal, 37
  - asphalt, 329
    - by P.A.D. district, 330
  - bioconversion, projection, 409
  - bituminous coal, 37
    - daily average by state, 123, 124
    - by method of loading, 125
    - by state, 173
    - world, 98
  - bituminous coal and lignite, 126, 181
    - daily average, 117
    - by district and mining method, 120
    - monthly averages by state, 118
    - by state and mining method, 119
  - coal, 3, 105, 117–126
    - daily average, 38–39
    - on Federal and Indian lands, 121
    - on Federal leases, projection, 122
    - *map*, 114
    - projection, 29
    - world, 95
  - coke, 329
    - by P.A.D. district, 330
  - distillate fuel oil, 329
    - by P.A.D. district, 330
  - electricity, 37
    - world, 27
  - energy, 29–39
    - by geographic area, *map*, 31
    - per capita, world, 27
    - projection, 29
    - world, 27–28

Production—Continued
- ethane, 329
  - by P.A.D. district, 330
- facilities for thermal and hydraulic energy, projection, 35
- facility, leadtimes for, 87
- fossil fuels, daily average, 38-39
- gas, 37, 191, 195, 197, 200, 203-209, 237
  - daily average, 38-39
  - projection, 29
  - by state, 209
    - gross, 204
    - net, 205
  - world, 185, 189
- gasoline, 329
  - by P.A.D. district, 330
- hydropower, 37
  - world, 23
- Index of Industrial, 56
- jet fuel, 329
  - by P.A.D. district, 330
- kerosine, 329
  - by P.A.D. district, 330
- lease condensate, daily average, 38-39, 309
- lignite, 37
  - by state, 173
    - daily average, 123, 124
  - world, 98
- liquefied gas, 329
  - by P.A.D. district, 330
- lubricants, 329
  - by P.A.D. district, 330
- naphthas, 329
  - by P.A.D. district, 330
- natural gas liquids, 197
  - daily average, 38-39, 309
  - by P.A.D. district, 330
  - projection, 288, 310
- nuclear energy, 37, 247
  - costs, projection, 259
  - *map*, 245
  - projection, 249
  - world, 241
- ocean-thermal energy, projection, 409
- oil, 3, 37, 297, 299, 303-311, 329
  - daily average, 38-39, 304, 309
    - by state 306
  - by geographic area, projection, 311
  - by P.A.D. district, 307, 330, 331
    - by state, 303
  - products, 329
    - by P.A.D. district, 330
  - projection, 29, 288, 310
  - by state, 298
  - stimulation by chemical explosive fracturing, *illus.*, 375
  - stimulation by massive hydraulic fracturing, *illus.*, 374
  - by sulfur content by P.A.D. district, 334
  - world, 281
    - daily average, 284
- petrochemical feedstocks, 329
  - by P.A.D. district, 330
- photosynthetic energy, projection, 409
- photovoltaic energy, projection, 409
- plant condensate by P.A.D. district, 330
- residual fuel oil, 329
  - by P.A.D. district, 330
- road oil, 329
  - by P.A.D. district, 330

- Production—Continued
  - shale oil, 401–405
    - land impacts, projection, 403
    - leadtimes, 402
    - projection, 29, 401
  - solar energy, projection, 409
  - solar energy heating and cooling, projection, 409, 412, 413
  - solar-thermal energy, projection, 409
  - still gas, 329
    - by P.A.D. district, 330
  - synthetic fuels, projection, 143
  - synthetic gas, projection, 29, 143
  - synthetic liquid fuel, projection, 143
  - uranium, 445–454
    - daily average, 449
    - projection, 452, 453, 457, 462
    - by state, 445
    - by type of mine, 446
    - world, 421
      - projection, 427, 428
  - uranium concentrate by state, 445
  - wax, 329
    - by P.A.D. district, 330
  - wind energy, projection, 409
  - zirconium, 263
- Products from:
  - Consol synthetic fuel process, 160
  - SASOL process, 159,
  - shale oil, 404
- Project Gasoline, 149
- Project Independence, 15
- Proved reserves, 21
- R. & D., *see* Research and development
- Radiation nuclear power plants pollution control, projection, 88
- Radioactivity, 439
  - *See also* Environment, Nuclear reactors, Plutonium, Pollution, Uranium
- Railroad transport of coal by state, 133–134
- Rationing, gasoline, 9
- Reactors, *see* Nuclear reactors
- Reclamation, land. 7
- Recoverable resources, 19–21
- Recovery, enhanced, of oil, *illus.*, 373
- Recovery efficiency, for oil 373
- Refineries blocked on environmental grounds, 332
- Refinery gas consumption by state, 333
- Refining:
  - oil, 327–334
    - by P.A.D. district and state, 327
    - world, 292
    - *See also* Production, oil
  - process, Coal-Oil-Gas (COG), *illus.*, 154
  - Syncrude, 405
  - water consumption in, processes, 167
- Refrigeration energy consumption, 53, 59
- Region, *see* Geographic area (of United States), Region of world, State, World
- Region of world:
  - anthracite coal exports to, 100, 102
  - bituminous coal exports to, 99, 101, 104
  - bituminous coal imports by customs district from, 103
  - *See also* World
- Requirements, *see* Consumption
- Research and development (R. & D.):
  - and energy, 79–81
  - fossil fuels, 9
  - funding from federal and private sectors, 81
  - funding for nuclear and renewable energy, 80
  - funding for synthetic fuels, projection, 145
  - geothermal, 9

Research and development—Continued
  nuclear energy, 9
  nuclear fusion, 9
  obligations and outlays, projection, 79
  program, 9
  for solar energy heating and cooling, projection, 412, 413
Reserve, Elk Hills Naval Petroleum, 5
Reserve, Naval Petroleum, No. 4, 6
Reserves:
  anthracite coal, 110
    minable by surface methods, 112
    minable by underground methods, 111
  bituminous coal, 110
    minable by surface methods, 112
    minable by underground methods, 111
  coal, 24, 109–114
    by geographic area, 109
    map, 114
    by state and by surface and underground mining methods, 113
    world, 21, 22, 95–97
  energy, 24
    world, 19–22
  fossil fuels, world, 22
  gas, 24, 195–200, 369
    in Canada, 188
    estimates, 197
    by state, 198
    world, 21, 22, 185–187
  geothermal, 24
  lignite, 110
    minable by surface methods, 112
    minable by underground methods, 111
  natural gas liquids, 296, 369
    estimates, 197
    by state, 369
    world, 21
  oil, 24, 295–298, 369
    Elk Hills Naval Petroleum Reserve, 5
    Naval Petroleum Reserve No. 4, 6
    by state, 295, 298
    world, 21, 22, 281–283
  proved, 21
  shale oil, 24, 397
    map, 398
    world, 22
  subbituminous coal, 110
    minable by surface methods, 112
    minable by underground methods, 111
  tar sands, world, 22
  uranium, 24, 433–440
    projection, 457, 460, 461, 475
    by state, 434–435
    world, 21, 22, 421, 422, 426
      by type of source, 423
  See also Stocks, Storage
Residential sector energy consumption, 59
  See also Consumer sector
Residual fuel oil:
  consumption, 312
    projection, 310
    by state, 333
  energy consumption, 60
  heat values, 37*n*
  imports, world, by sulfur content, 355–356
  production, 329
    by P.A.D. district, 330
  sales by state and P.A.D. district, 346
  stocks, 340

Residual heating oil sales by state and P.A.D. district, 348
Resources:
    anthracite coal, 110
    bituminous coal, 110
    coal, 24, 110
        world, 21, 95–98
    energy, 24
        world, 19–24
    gas, 24
        undiscovered, projection, 199
        world, 21, 185, 186
    geothermal, 24
        map, 91
    lignite, 110
    natural gas liquids, world, 21
    oil, 24
        world, 21, 281, 282
    recoverable, 19–21
    shale oil, 24, 397
    subbituminous coal, 110
    uranium, 24, 435–437
        development possibilities, 439
        world, 21, 421, 422, 426
            map, 424, 425
River and ex-river transport of coal, 136
Road oil:
    production, 329
        by P.A.D. district, 330
    stocks, 340
Safety, nuclear, R. & D. funding for, 80
Sales:
    distillate fuel oil by P.A.D. district and state, 346
    distillate heating oil by P.A.D. district and state, 347
    fuel oil by P.A.D. district and state, 349
    gas:
        by consumer sector, 233, 234
            by state, 222
        by industry type, 214
    residual fuel oil by P.A.D. district and state, 346
    residual heating oil by P.A.D. district and state, 348
SASOL process, products from, 159
Service wells by state, 387
Shale oil, 397–405
    consumption, 404
    costs, 405
    energy balance, 404
    production, 401–405
        land impacts, projection, 403
        leadtimes, 402
        projection, 29, 401
    products from, 404
    reserves, 24, 397
        map, 398
        world, 22
    resources, 24, 397
    water consumption during conversion processes, 167
    See also Oil
Shallow-pool tests, oil drilling activity by state, 364
Shipping, *see* Transport
SNG (Substitute natural gas), *see* Synthetic gas
Solar energy, 409–417
    fuel savings using, projection, 415–417
    production, projection, 409
    R. &. D. funding for, 80, 81
    R. & D. obligations for, projection, 79

- Solar energy heating and cooling, 15
  - agency management roles, 414
  - impact of, projection, 410, 411
  - implementation of, projection, 409
  - projection, 412
  - research and development, projection, 412, 413
- Solar-thermal energy
  - impact of, projection, 410, 411
  - implementation of, projection, 409
  - *See also* Solar energy heating and cooling
- Solid fuels, *see* Coal
- Solid waste pollution control, projection, 88
- Solvent Refined Coal, costs, projection, 149
- Space hearing energy consumption, 53, 59
- State:
  - anthracite coal:
    - reserves minable by surface methods, 112
    - reserves minable by underground methods, 111
  - bituminous coal:
    - production, 173
      - daily average, 123, 124
      - by method of loading, 125
    - reserves minable by surface methods, 112
    - reserves minable by underground methods, 111
    - strip mine characteristics, 176
    - underground mine characteristics, 175
    - value, 123, 172, 173
  - bituminous coal and lignite:
    - production by mining method, 119
    - production in monthly averages, 118
    - transport by geographic area, 137
    - transport by railroad, 133–134
    - transport by unit train, 135
    - transport by waterway, 134
  - coal:
    - consumption, 333
      - by electrical sector, 36
    - reserves by surface and underground mining methods, 113
  - coke consumption, 333
  - core tests, 387
  - development wells drilled, 388
  - distillate fuel oil consumption, 333
  - distillate fuel oil sales by P.A.D. district, 346
  - distillate heating oil sales by P.A.D. district, 347
  - dry holes, 386, 388–390
  - electricity consumption, 333
  - exploratory wells drilled, 388
  - fuel oil sales by P.A.D. district, 349
  - gas:
    - consumption, 217, 333
      - by consumer sector, 218
      - for electric generation, 219
      - by electrical sector, 36
      - for househeating, 221
    - production, 209
      - gross, 204
      - net, 205
    - refinery, consumption, 333
    - reserves, 198
    - sales by consumer sector, 222
    - storage, 230
    - transport, 209, 226
    - wells, 203, 206, 207, 386, 388–390
      - projection, 391

State—Continued
    lignite:
        production, 173
            daily average, 123, 124
            reserves minable by surface methods, 112
            reserves minable by underground methods, 111
            values, 123, 172, 173
    liquefied gas consumption, 333
    man-days worked in coal mines, 123, 124
    mines, number of coal, 123, 124
    natural gas liquids reserves, 369
    new-field wildcat wells drilled, 390
    nuclear energy consumption by electrical sector, 36
    oil:
        consumption, 333
            by electrical sector, 36
        drilling, 362, 364
            projection, 366
            rigs, number of, 352
        production, 298
            daily average, 306
            by P.A.D. district, 303
        refining, by P.A.D. district, 327
        reserves, 295, 298
        stocks by state of location, 338, 339
        stocks by state of origin, 337
        wells, 308, 363, 364, 386, 388–390
            drilling by depth, 365
            projection, 391
    purchased steam consumption, 333
    refinery gas consumption, 333
    residual fuel oil consumption, 333
    residual fuel oil sales by P.A.D. district, 346
    residual heating oil sales by P.A.D. district, 348
    service wells, 387
    stratigraphic drilling, 387
    subbituminous coal:
        reserves minable by surface methods, 112
        reserves minable by underground methods, 111
    thermal energy consumption by electrical sector, 36
    uranium:
        drilling, 474
        production, 445
        reserves, 434–435
    uranium concentrate production, 445
    wells, service, 387
    See also Geographic area (of United States)
State of the Union address, 3–11
Steam, purchased, consumption by state, 333
Steel and rolling mills consumption of coal, 130
Still gas production, 329
    by P.A.D. district, 330
Stirred Fixed Bed Gas Producer, costs, projection, 150
Stocks:
    asphalt, 340
    coke, 340
    distillate fuel oil, 340
    ethane, 340
    of fuel oil by sulfur content by P.A.D. district, 341
    gasoline, aviation, 340
    gasoline, motor, 340
    jet fuel, 340
    kerosine, 340
    lubricants, 340
    naphthas, 340

- Stocks—Continued
  - oil, 337–341
    - by P.A.D. district, 307, 340
    - products, 340
    - by state of location, 338, 339
    - by state of origin, 337
  - petrochemical feedstocks, 340
  - residual fuel oil, 340
  - road oil, 340
  - wax, 340
  - *See also* Reserves, Storage
- Storage:
  - gas, 229–230
    - by state, 230
      - underground, 198
  - oil, 9
  - *See also* Reserves, Stocks
- Stratigraphic oil drilling by state, 362
- Stratigraphic oil and gas drilling by state, 387
- Strip mine:
  - characteristics by state, 176
  - production of coal by state, 124
  - value of coal by state, 172
- Strip mining of coal by district, 120
- Strip mining of coal by state, 119
- Subbituminous coal:
  - reserves, 110
    - minable by surface methods, 112
    - minable by underground methods, 111
  - resources, 110
  - *See also* Coal
- Substitute natural gas, 163, 164
  - production and consumption, 237
  - sulfur balance for coal to, 163
  - sulfur balance in Consol synthetic fuel process, 160
- Sulfur content:
  - of coal resources, 110
  - and consumer use of transported coal, 138
  - of fuel oil stocks by P.A.D. district, 341
  - imports of residual fuel oil by, 355–356
  - of oil produced by P.A.D. district, 334
- Sulfur oxide air quality standards, 89
- Sun power, *see* Solar energy
- Supplies, uranium, 457–469
- Supply, *see* Production
- Support projects for synthetic fuels, R. & D. funding, projection, 145
- Surface coal mines:
  - coal reserves minable by, 112, 113
  - facility production leadtimes, 87
  - production and number of, 126
- Surface uranium drilling, 474
- Suspended oil drilling in Canada, 383
- Syncrude refining, 405
- Synthane, 15
  - costs, projection, 152
- Synthetic fuels:
  - from coal, 143–167
    - prices, projection, 166
  - costs, 144
    - projection, 155
  - efficiency, conversion, projection, 155
  - Pioneer Program, R. & D. funding, projection, 145
  - production, projection, 143
  - program, 9
  - support projects, R. & D. funding, projection, 145

- Synthetic gas:
  - consumption, projection, 54, 55
    - by consumer sector, 50–51
  - costs, facility, projection, 86
  - energy balance for coal to substitute natural gas, 163
  - facility production leadtimes, 87
  - production, projection, 29, 143
  - R. & D. funding, projection, 145
  - *See also* Gas, Synthetic fuels
- Synthetic gas sector, *see* Consumer sector
- Synthetic liquid fuel production, projection, 143
- Synthetic oil, R. & D. funding, projection, 145
- Synthoil, costs, projection, 149
- Systems studies, R. & D. funding for, 81
- Tar sands, reserves, world, 22
- Tax:
  - credit, investment, 7
  - gas excise, 5
  - oil excise, 5
  - revenue on oil excise, 379
  - windfall profits, 5
- Taxes, Btu, impact on energy consumption and prices, projection, 64
- Thermal efficiency, *see under* Efficiency
- Thermal energy consumption by electrical sector by state, 36
- Thermal energy production facilities, projection, 35
- Three-state Combustion for MHD Power Generation Project, projection, 148
- Tidewater transport of coal, 136
- Trade, *see* Exports, Imports
- Tramway transport of coal, 136
- Transmission gas mains, 225, 226
- Transmission lines, *see* Transport
- Transport:
  - asphalt and road oil, 318–319
  - bituminous coal and lignite:
    - by geographic area and state of destination, 137
    - by state and railroad, 133–134
    - by state and unit train, 135
    - by state and waterway, 134
    - by sulfur content, consumer use, and district, 138
    - by transport method, 136
  - coal, 133–139
    - costs, 139
    - methods of, 136
  - distillate fuel oil, 317–321
  - electricity costs, 139
  - gas, 225–226
    - by state, 209, 226
  - gasoline, 317–321
    - aviation, 323
  - jet fuel, 317–321, 323
  - kerosine, 317–321
- liquefied gas, 318–319
  - lubricating oil, 318–319
  - natural gas liquids, 317–321
  - oil, 317–323
    - via Great Lakes and Ohio River, 321
    - by oil product, 317
      - by P.A.D. district, 318–323
  - petrochemical feedstocks, 318–319
  - road oil and asphalt, 318–319
  - wax, 318–319
- Transportation costs, facility, projection, 86
- Transportation energy consumption, 53
- Transportation sector energy consumption, 60
  - *See also* Consumer sector
- Truck transport of coal, 136

Underground coal mine:
  characteristics by state, 175
  coal reserves minable by, 111, 113
  facility production leadtimes, 87
  production by state, 124
  production and number of, 126
  value of coal by state, 172
Underground mining of coal by district, 120
Underground mining of coal by state, 119
Underground production of coal by state, 125
Underground storage of gas by state, 198
Underground uranium mines, 446
Unemployment, *see* Employment
Unit train costs, 139
Unit train transport of coal by state, 135
United States, breakdown by:
  customs district, *see* Customs district
  P.A.D. district, *see* Petroleum Administration for Defense district
  region, *see* Geographic area (of United States)
  state, *see* State
Uranium, 421–475
  consumption, projection, 438, 457–463, 466
    world, 426, 427
  costs, 433, 434, 437, 438, 450, 451, 454
    projection, 452–454
  delivery commitments, projection, 464
  from diffusion plant operations, 266
  discovery rates, projection, 475
  drilling 440, 441, 473–475
    projection, 475
    by state, 474
    surface, 474
  energy content, 24*n*
  enrichment, R. & D. funding for, 80
  enrichment plants, projection, 264
  exploration, projection, 450, 451, 454
  fuel cycle, *illus.*, 257
  fuel cycle interrelationships, 265
  hole depths, 441
  imports, projection, 429
  inventories, 273
  invitations to bid on, projection, 467
  mill size, 453
  mines, 446
  mining districts, *map*, 448
  in the nuclear fuel cycle, *illus.*, 262
  prices, projection, 465
  production, 445–454
    daily average, 449
    projection, 452, 453, 457, 462
    by state, 445
    world, 421
      projection, 427, 428
  reprocessing, projection, 260, 261
  reserves, 24, 433–440
    projection, 457, 460, 461, 475
    by state, 434–435
    world, 21, 22, 421–423, 426
      by type of source, 423
  requirements for light-water reactors, 268
  requirements for nuclear energy, projection, 469
  requirements for nuclear reactors, projection, 253
  resource development possibilities, 439

- Uranium—Continued
  - resources, 24, 435–437
    - world, 21, 421, 422, 426
      - *map*, 424, 425
  - returns, projection, 260 261
  - and separative work commitments, projection, 267
  - supplies, 457–469
  - supply arrangements, nuclear capacity with firm, 468
  - water consumption during processing, 167
  - *See also* Nuclear energy, Plutonium
- Uranium concentrate production by state, 445
- Uranium oxide, *see* Uranium
- Use, *see* Consumption
- Utility electricity eenrgy consumption, 60
- Value:
  - anthracite coal exports, 102
  - bituminous coal:
    - exports to region of world, 101, 104
    - by state, 172, 173
      - daily average, 123
  - lignite by state, 123, 172, 173
- Water consumption in refining and conversion processes, 167
- Water heating energy consumption, 53, 59
- Water pollution control, projection, 88
  - *See also* Environment, Pollution
- Water power, *see* Hydropower
- Waterflooding, miscible-fluid, 373
- Waterway transport of coal by state, 134
- Wax:
  - heat values, 37*n*
  - production, 329
    - by P.A.D. district, 330
  - stocks, 340
  - transport, 318–319
- Waxes and lubes energy consumption, 60
- Wells:
  - drilling, projection, 290
  - gas:
    - completions, 385
    - costs, 392, 393
    - production, 208
    - projection, 288
    - by state, 203, 206, 207, 386, 388–390
      - projection, 391
  - oil:
    - completions, 304, 385
    - costs, 392, 393
    - drilling, in Canada, 291
    - drilling by depth by state, 365
    - price indexes for equipment, 350
    - production, 208
    - projection, 288
    - by state, 308, 363, 364, 386, 388–390
      - projection, 366, 391
  - oil and gas, drilling, 383–393
  - service, by state, 387
- Wet natural gas, *see* Gas, Natural gas liquids
- Wildcat wells, projection, 288
- Wind energy:
  - impact of, projection, 410, 411
  - implementation of, projection, 409
  - *See also* Solar energy heating and cooling

World:
  bituminous coal production, 98
  coal:
    consumption, projection, 45, 46
    production, 95
    reserves, 21, 22, 95–97
    resources, 21, 95–98
  electricity:
    consumption, 28
    production, 27
  energy:
    consumption, 43–46
      projection, 43, 44
      relative to Gross National Product growth, 71
    production, 27–28
    reserves, 19–22
    resources, 19–24
  fossil fuel reserves, 22
  gas:
    consumption, projection, 45, 46
    production, 185, 189
    reserves, 21, 22, 185–187
    resources, 21, 185, 186
  geothermal consumption, projection, 45, 46
  hydropower:
    consumption, projection, 45, 46
    production, 23
  lignite production, 98
  natural gas liquids reserves and resources, 21
  nuclear energy:
    consumption, projection, 45, 46
    production, 241
  oil:
    consumption, projection, 45, 46
    exports, daily average, 287
    imports, daily average, 285, 286
    imports, source of, 289
    prices, reduction in, 4
    production, 281
      daily average, 284
    refining, 292
    reserves, 21, 22, 281–283
    resources, 21, 281, 282
  residual fuel oil imports, by sulfur content, 355–356
  shale oil reserves, 22
  tar sands reserves, 22
  uranium:
    consumption, projection, 426, 427
    production, 421
      projection, 427, 428
    reserves, 21, 22, 421–423, 426
      by type of source, 423
    resources, 21, 421, 422, 426
      map, 424, 425
  See also Region of world
Zirconium production, 263